PB82-148164

Highway Construction Noise Field Measurements
Site 3: 1-95/395 (Maryland) (Appendix C)

Wyle Labs./Wyle Research
Arlington, VA

Prepared for

Environmental Protection Agency
Washington, DC

Oct 81

U.S. Department of Commerce
National Technical Information Service
NTIS.

PB82-148164

APPENDIX C

HIGHWAY CONSTRUCTION NOISE FIELD MEASUREMENTS, SITE 3: I-95/395 (MARYLAND)

October 1981

Office of Noise Abatement & Control
U. S. Environmental Protection Agency
Washington, D. C. 20460

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16. ABSTRACT

This study investigated the noise associated with highway construction activities. It involved the identification and examination of: highway construction activities, noise characteristics associated with highway construction activities, availability of highway construction noise abatement measures, demonstration of construction site noise abatement measures, and development of a computer-based model for use as a tool to predict the noise impact of construction activities and to plan mitigation measures. The model was developed for use on the FHWA computer (IBM 360).

A total of seven reports were prepared in this study and have been released for public distribution.

This report

Reports (Part D through Part G) contain field data gathered at the field demonstrations at highway construction sites in: Route I-201, California; I-205, Oregon; I-95/I-395, Maryland; and I-75, Florida. They contain noise data on single and multiple pieces of equipment, provide general description of highway site activities, and activity analyses of equipment.

17. KEY WORDS AND DOCUMENT ANALYSIS

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This report has been approved by EPA for general availability. The contents of this report reflect the views of the contractor, who is responsible for the facts and the accuracy of the data presented herein, and do not necessarily reflect the official views or policy of EPA or DOT. This report does not constitute a standard, specification, or regulation,

PERMISSION IS GRANTED TO REPRODUCE THIS MATERIAL WITHOUT FURTHER CLEARANCE.

FORWARD

This study was jointly sponsored, through an Interagency Agreement (IAG), by the Office of Noise Abatement and Control (ONAC), U.S. Environmental Protection Agency (EPA), and the Federal Highway Administration (FHWA), U.S. Department of Transportation (DOT). The study was conducted by Wyle Laboratories under contract to FHWA Contract No. DOT-FH-11-9455. Wyle Research of El Segundo, California, and Wyle Research of Arlington, Virginia, performed the study.

The object of the study was to investigate and study the noise associated with highway construction activities. The study involved the identification and examination of: highway construction activities, noise characteristics associated with highway construction activities, availability of highway construction noise abatement measures, demonstration of construction site noise abatement measures, and development of a computer-based model for use as a tool to predict the noise impact of construction activities and to plan mitigation measures. The model was developed for use on the FHWA computer (IBM 360).

The principal project officers for Wyle Laboratories on this project were Mr. William Fuller of Wyle Research in El Segundo and Dr. Kenneth Plotkin of Wyle Research of Arlington, Virginia.

The government project managers for the study were Mr. Fred Romano of FHWA, and Mr. Roger Heymann of EPA/ONAC.

The various technical reports completed by Wyle under this contract and submitted to FHWA have been released for public distribution by EPA.

PREFACE

This study involved a comprehensive review of the environmental noise associated with highway construction activities. A total of seven reports have been released for public distribution. These reports are:

1. Analysis and Abatement of Highway Construction Noise, EPA 550/9-81-314-A, September 1981.
2. A Model for the Prediction of Highway Construction Noise, EPA 550/9-81-314-B, September 1981.
3. IBM 360/System Batch Version of Highway Construction Noise Model, EPA 550/9-81-314-C, September 1981.
4. Appendix A, Highway Construction Noise Field Measurements, Site 1: I-201 (California), EPA 550/9-81-314-D, September 1981.
5. Appendix B, Highway Construction Noise Field Measurements, Site 2: I-205 (Oregon), EPA 550/9-81-314-E, September 1981.
6. Appendix C, Highway Construction Noise Field Measurements, Site 3: I-95/I-395 (Maryland), EPA 550/9-81-314-F, September 1981.
7. Appendix D, Highway Construction Noise Field Measurements, Site 4: I-75 (Florida), EPA 550/9-81-314-G, September 1981.

The first two reports (Part A and Part B) might be considered the principal reports since they are relatively self-contained units on this study's efforts, the engineering studies and the computer model, respectively. In this regard, if there is to be a limited purchase of the reports, one might consider obtaining either or both of Part A and Part B, and obtaining the other reports as additional informational needs arise.

- The first report (Part A) contains all of the information from the engineering study phase of the project. It gives information on highway construction procedures, highway construction site noise characteristics, available abatement measures, and results from field demonstrations on noise abatement.

- The second report (Part B) presents a complete description of the highway noise prediction model. The report contains a description of the model's formulation and construction, a description of the program, and a user's manual.

- The third report (Part C) provides additional information to the Part B report on the highway construction noise model installed at DOT's Transportation Computer Center on an IBM 360 computer. It delineates the differences between the version of the model as installed on the IBM 360 and the two models (HINPUT and HICNOM) operating on the Wyle Computer (PDP-11). The report has additional user's manual information for use on the IBM 360, a programmer's manual describing changes in going from the PDP-11 to the IBM 360, and a maintenance manual.

- Reports 4, 5, 6, and 7 (Part D through Part G) contain field data gathered at the field demonstrations at highway construction sites in: Route I-201, California; I-205, Oregon; I-95/I-395, Maryland; and I-75, Florida. They contain noise data on single and multiple pieces of equipment, provide general description of highway site activities, and activity analyses of equipment.

APPENDIX C

This appendix summarizes the field measurements performed at the I-95/I-395 (Maryland) construction site during November 1979. Located in the City of Baltimore, this test site was highly typical of highway construction projects in urban, high-density housing areas. The test site actually encompassed four distinct projects in close proximity to each other:

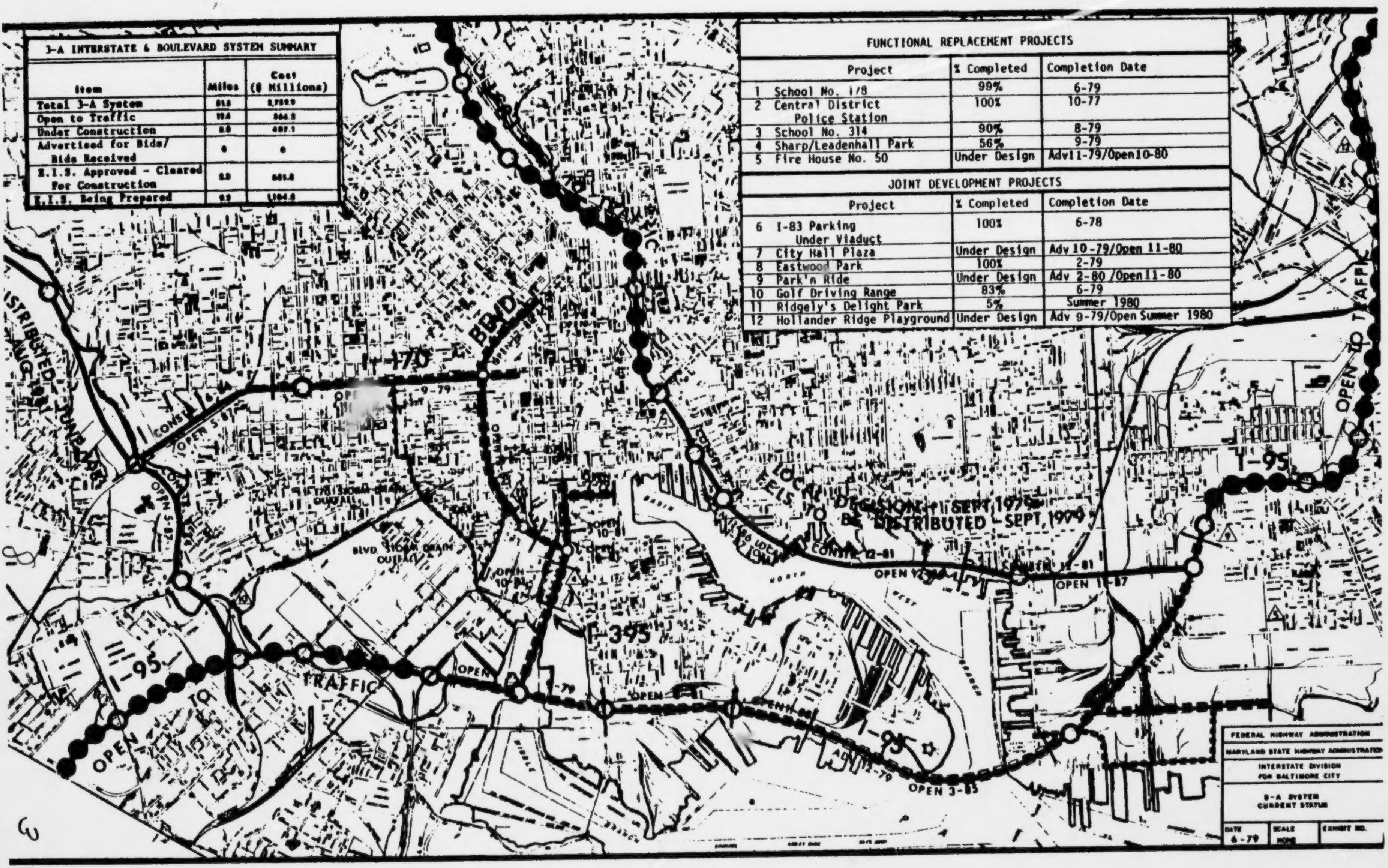
- I-95
- I-395
- I-170
- "Boulevard" project

A further description of these projects is presented in Section 3.5 of the main report.

The following data and information are presented in this appendix:

1. General highway site description.
2. Noise measurements of activities involving single or multiple pieces of equipment; diagrams describing each activity site are included.
3. Controlled single equipment noise measurements of selected equipment.
4. Equipment activity analysis of selected equipment.

A summary of key construction noise data derived from this site is presented in Section 3.5.3 of the main report.



3-A INTERSTATE & BOULEVARD SYSTEM SUMMARY		
Item	Miles	Cost ($ Millions)
Total 3-A System	31.6	2,759.9
Open to Traffic	12.4	864.5
Under Construction	6.0	487.1
Advertised for Bids/ Bids Received	0	0
E.I.S. Approved - Cleared For Construction	3.3	481.0
E.I.S. Being Prepared	9.2	1104.8

FUNCTIONAL REPLACEMENT PROJECTS

	Project	% Completed	Completion Date
1	School No. 1/8	99%	6-79
2	Central District Police Station	100%	10-77
3	School No. 314	90%	8-79
4	Sharp/Leadenhall Park	56%	9-79
5	Fire House No. 50	Under Design	Adv11-79/Open10-80

JOINT DEVELOPMENT PROJECTS

	Project	% Completed	Completion Date
6	I-83 Parking Under Viaduct	100%	6-78
7	City Hall Plaza	Under Design	Adv 10-79/Open 11-80
8	Eastwood Park	100%	2-79
9	Park'n Ride	Under Design	Adv 2-80 /Open11-80
10	Golf Driving Range	83%	6-79
11	Ridgely's Delight Park	5%	Summer 1980
12	Hollander Ridge Playground	Under Design	Adv 9-79/Open Summer 1980

FEDERAL HIGHWAY ADMINISTRATION
MARYLAND STATE HIGHWAY ADMINISTRATION
INTERSTATE DIVISION
FOR BALTIMORE CITY

3-A SYSTEM
CURRENT STATUS

DATE	SCALE	EXHIBIT NO.
6-79	NONE	

3

Measurement Site Data

Highway: I-95/395 **Date:** Nov. 1979

Site Location: Fill Area I - Approach ramp to Green St. Overpass (Blvd project)

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☑ Site Boundary ☑ Single Equipment ☐ Movies

Soil/Terrain Conditions: Flat terrain; compacted dirt

Machinery Description:
Gradall G660 Backhoe
Autocar & Mack Single Chassis Dump Trucks
Caterpillar D6 Dozer
Vibratory Roller (Type unknown)
Liebherr Series B, 911 Backhoe

Note: Dump trucks operated at low speed on site

Miscellaneous Information: See diagram for specific equipment location during each recording.

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Fill Area I

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-6	F-1	11-6	0845	:13	11-6A	Activity: North site boundary	✓
-7	F-2	↓		–	11-6A	Single Equipment:	✓
-8	F-3			:07	11-6A	Activity: Doze & roller	✓
-9	F-4			:09	11-6A	Activity: South site boundary near backhoe	✓
15B-1	F-5	11-7		2:30	11-6A	Site Boundary	✓
MET-1	–	11-6		–	11-6B	Single Equipment measurement with Sound Level meter	✓
MET-2	–	11-6		–	11-6C	Single Equipment measurement (with Sound Level meter	✓
47-26	F-6	11-7		–	11-7D	Single Equipment: Low-speed dump truck passbys	✓

ACTIVITY NOISE MEASUREMENTS

HIGHWAY: I-95/395 **DATE:** Nov. 1979

SITE LOCATION: Fill Area I

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_1
47-6	F-1	11-6	:13	77.4	70	72	77	80	88
-8	F-3	11-6	:07	78.6	76	76	78	80	83
-9	F-4	11-6	:09	71.4	62	63	71	74	76

SITE BOUNDARY/COMMUNITY NOISE MEASUREMENTS

HIGHWAY: I-95/395

DATE: Nov 1979

SITE LOCATION: Fill Area I

Sample	Location	Date	Dur.	L_{eq}
158-1	F-5	11-7	2:30	73.9

SINGLE EQUIPMENT/PROPAGATION NOISE MEASUREMENTS

HIGHWAY: I-95/395

DATE: Nov. 1979

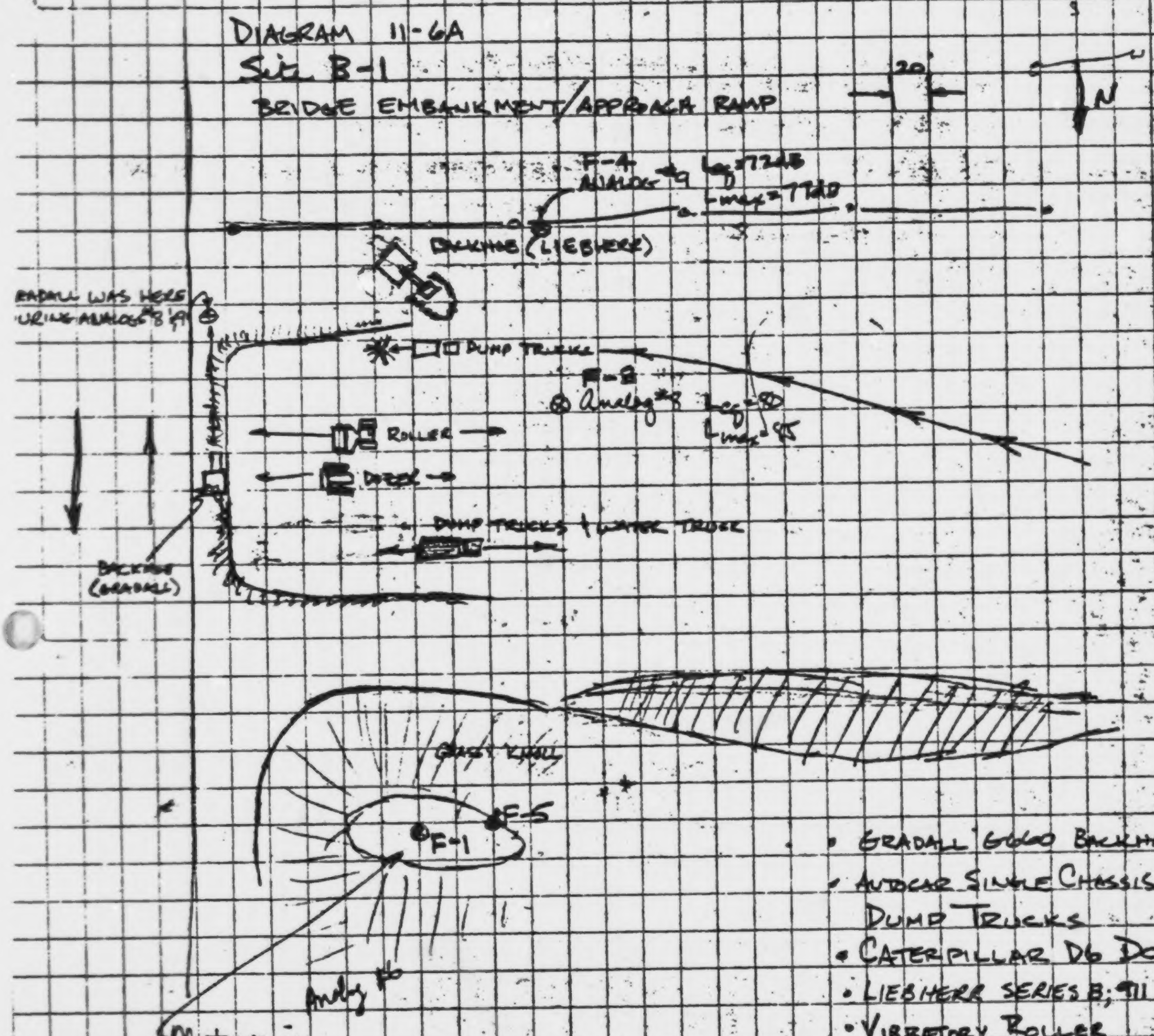
SITE LOCATION: Fill Area I

Sample	Location	Date	Equipment	L_{max} @ 50 ft.	L_{max} @ ___ ft.	L_{max} @ ___ ft.
47-7	F-2	11-6	Vibratory Roller	86		
-7	F-2	11-6	D6 Dozer	84		
MET-1	1 —	11-6	Jaeger 600 CFM Air Compressor	84		
MET-2	—	11-6	Homelite 3500 Watts, 120V Gas. Generator	~~82~~ 76		
47-26	F-6	11-7	Low speed Dump truck passing	85-90		

DIAGRAM 11-6A

Site B-1

BRIDGE EMBANKMENT/APPROACH RAMP



Metrosonics

L_A = 76-79 dB

L_{eq} = 79 dB ; 5 min

L_{max}

- GRADALL G660 BACKHOE
- AUTOCAR SINGLE CHASSIS DUMP TRUCKS
- CATERPILLAR D6 DOZER
- LIEBHERR SERIES B; 911 BACK
- VIBRATORY ROLLER (NO NAME)

*NOTE: WHEN DIGITAL #1 WAS RECORDED ON 11-7, GRADALL BACKHOE WAS NOT OPERATING

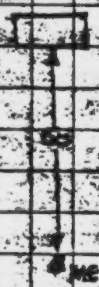
Single Equipment:

GRADALL BACKHOE; 40' from side with fan; constant high RPM's; L_{MAX} = 85-87 dB

ANALOG #7 { Roller @ 50' = 85 side; 88 when facing fan
Dozer @ 50' = 83 side

DIAGRAM 11-6B

(SEE PHOTO)



Sleegen Air Compressor
10 Side of Shop
Detroit Diesel 6 cyl. @ 1300 RPM

METROSONICS L_{max} = 84 dB

DIAGRAM 11-6C

Homelite 3500 Watts; 120 Volts
Gasoline Generator
(New)

Metrosonics L_{max} = 92 dB
L_{eq} = 80 dB for 2 min

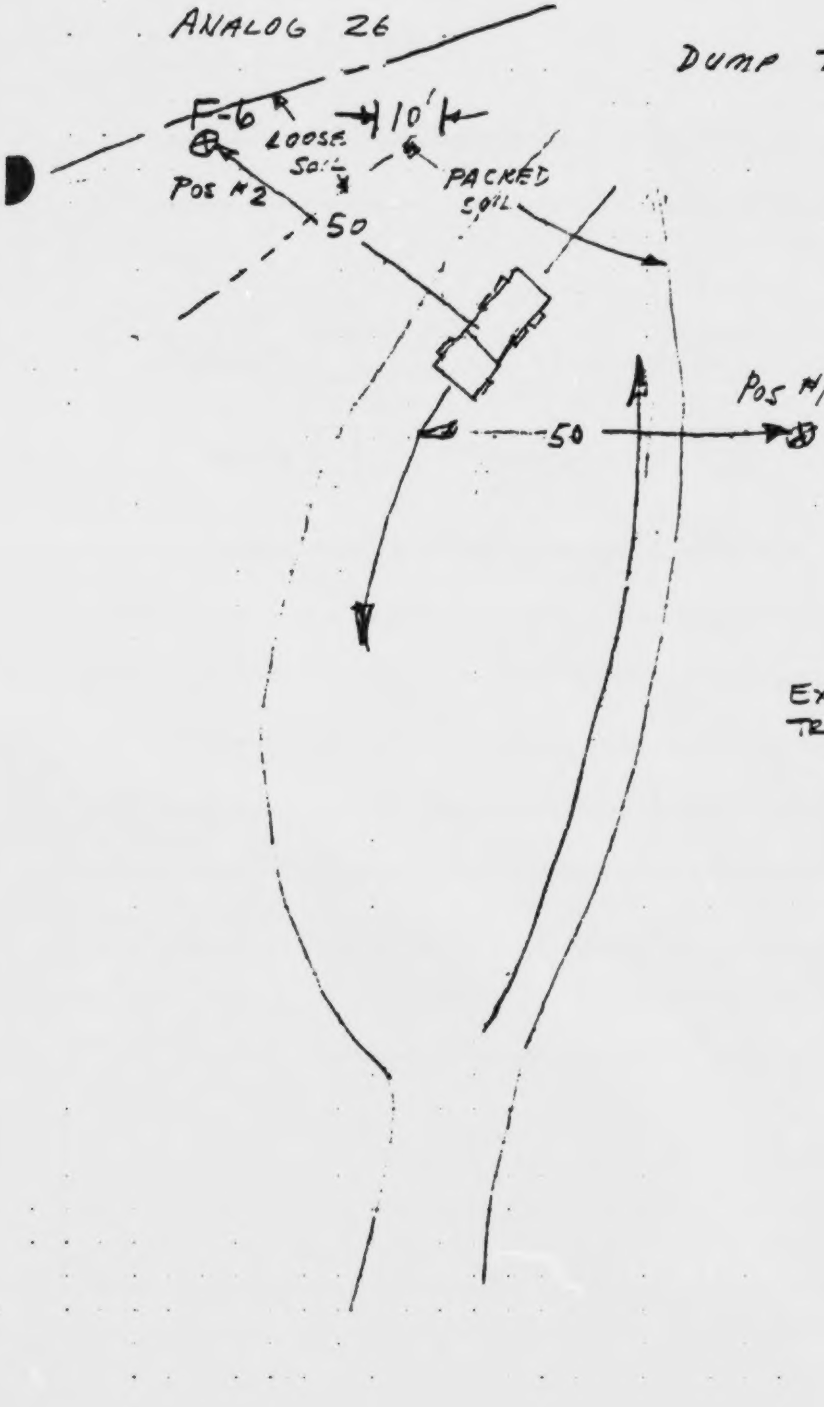
76 @ 50
74 dB @ 50

DIAGRAM 11-7D

ANALOG 26

ENTRANCE TO FILL AREA FOR OVERPASS

DUMP TRUCK PASSBY



(RECORD FOR ONLY APPROX. 1 MIN THEN MOVED TO POS #2)

EXHAUST FACES MIC. WHEN TRUCK IS PASSING N-TO-S.

Measurement Site Data

Highway: I-95/395 **Date:** Nov 1979

Site Location: Fill Area II - Compaction of approach ramp fill

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☑ Single Equipment ☐ Movies

Soil/Terrain Conditions: Damp, compacted earth

Machinery Description:

Cat 470 Single engine sheep's foot compactor (modified scraper with sheep's foot roller).

Buffalo-Springfield KA5B single engine compactor

Miscellaneous Information:

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Fill Area II

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-3	F-7	11-5	1545	:03	11-5B	Activity measurement: compactor working alone on approach ramp fill	✓
-29	F-8	11-7	1520	–	11-7G	Compactor passby measurement; sample two short for Leq	✓
-28	F-9	11-7	1500		11-7F	DATA NOT GOOD	✓

ACTIVITY NOISE MEASUREMENTS

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Fill Area II

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_1
47-3	F-7	11-5	.03	73.2	66	67	72	77	80

SINGLE EQUIPMENT/PROPAGATION NOISE MEASUREMENTS

HIGHWAY: I - 95/395

DATE: Nov. 1979

SITE LOCATION: Fill area II

Sample	Location	Date	Equipment	L_{max} @ 50 ft.	L_{max} @ ___ ft.	L_{max} @ ___ ft.
47-3	F-7	11-5	Cat 470 Compactor	80		
-29	F-8	11-5	B-S K45B Compactor	93		

DIAGRAM 11-5B

Modified Scraper w/ Roller

CAT A70

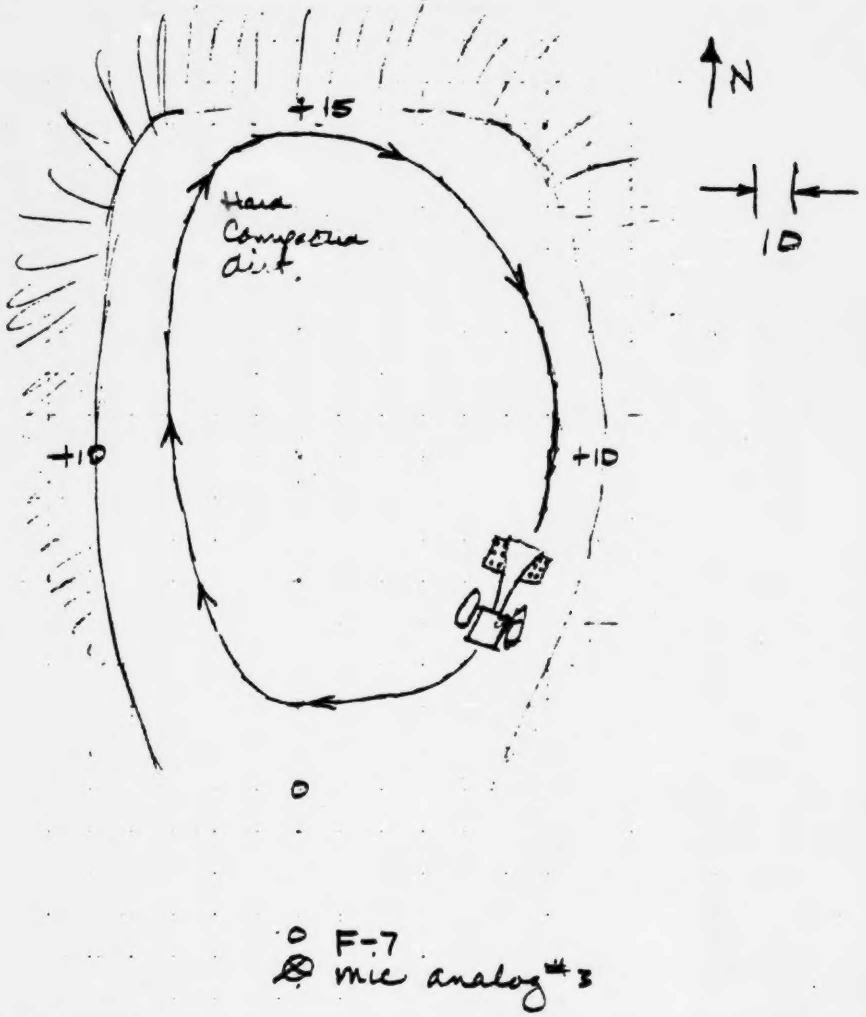
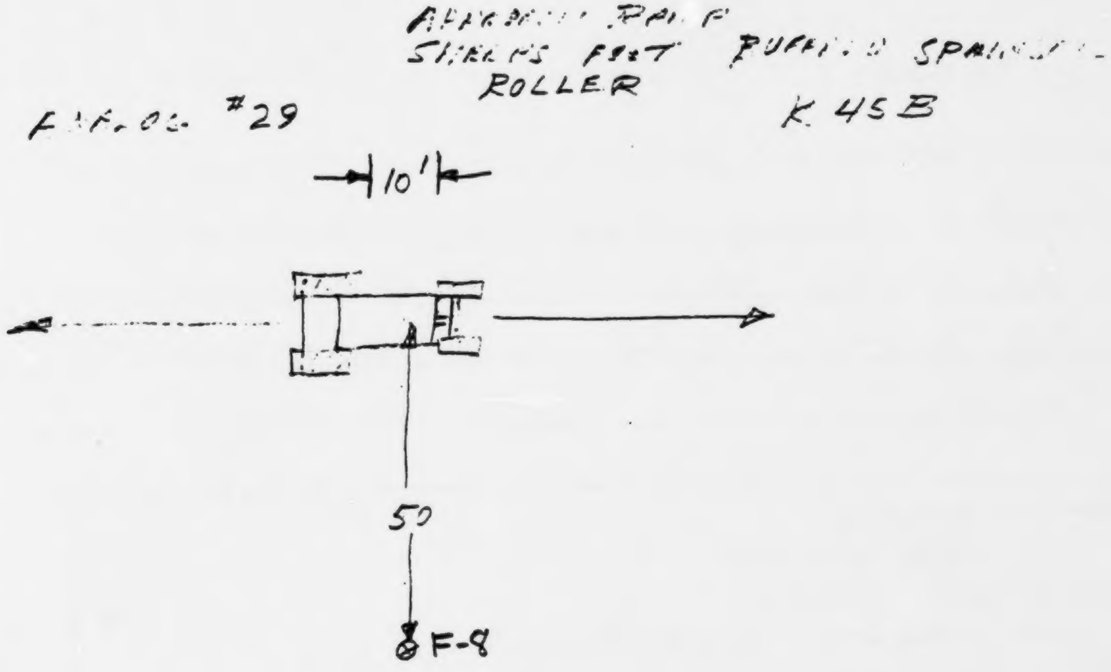


DIAGRAM 11-76



Measurement Site Data

Highway: I-95/395

Date: Nov. 1979

Site Location: Earthwork Site 1

Type of Measurements:

☐ Community
☑ Activity
☐ Propagation
☑ Site Boundary
☑ Single Equipment
☑ Movie

Soil/Terrain Conditions: Site completed clear of trees, etc. Approach ramps exist along both sides of right-of-way. Center area of site is relatively flat terrain. Haul roads are shown on diagram.

Machinery Description:
Cat 225 Backhoe
Cat 12F Grader
Cat Scrapers (Type Unknown)
Cat D6 Dozer
Hyster Twin-Engine Sheep's Foot Compactor, C450A
John Deere 450C dozer (small)

Miscellaneous Information:
Sample 47-40 : at grade with fill operation
47-42 : +25 feet above grade
178-1 : +25 feet above grade

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork Site I

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
178-1	EW-1	11-8	1340	2:35	11-8E	Long-term site boundary measurement	✓
47-37	EW-2	↓		0:06	11-8E	Crane working on bridge pier framework	✓
-38	EW-3			:13	11-8E 11-8F	Backhoe digging trench	✓
-39	EW-4			:11	11-8E 11-8G	Scraper passbys; ENGINE/EXHAUST FACING MIC. ; DURING LOADED PASSBY	✓
-40	EW-5				11-8E 11-8H	w/MOVIES; Fill op. on approach ramp	✓
-41	–	–	–	–	–	N/G	
-42	EW-6	↓		:15	11-8E	East side boundary, on approach ramp	✓
-43	EW-7			–	11-8E 11-8I	Scrapers filling with dozers pushing	✓
-41	EW-21		–	–	11-8J	Stationary runup test on Hyster Twin Engine Compactor	✓

SITE BOUNDARY/COMMUNITY NOISE MEASUREMENTS

HIGHWAY: I-95/395 DATE: Nov. 1979

SITE LOCATION: Earthwork Site I

Sample	Location	Date	Dur.	L_{eq}
178-1	EW-1	11-8	2:35	78.3

ACTIVITY NOISE MEASUREMENTS

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork Site I

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_1
47-37	EW-2	11-8	:06	74.6	67	70	73	78	82
-38	EW-3	11-8	:13	83.6	72	73	83	87	87
-39	EW-4	11-8	:11	78.6*	70	71	74	83	87
-40	EW-5	11-8	:15	80.8	69	73	79	85	89
-42	EW-6	11-8	:15	81.8	71	74	80	84	87
-43	EW-7	11-8	:14	84.6	69	70	78	89	93

*SAMPLE INCLUDES PILE DRIVER ACTIVITY; LEQ IS MORE REPRESENTATIVE OF SITE BOUNDARY LEVEL THAN HAUL ROAD SITE

SINGLE EQUIPMENT/PROPAGATION NOISE MEASUREMENTS

HIGHWAY: I-95/395 DATE: Nov. 1979

SITE LOCATION: Earthwork Site I

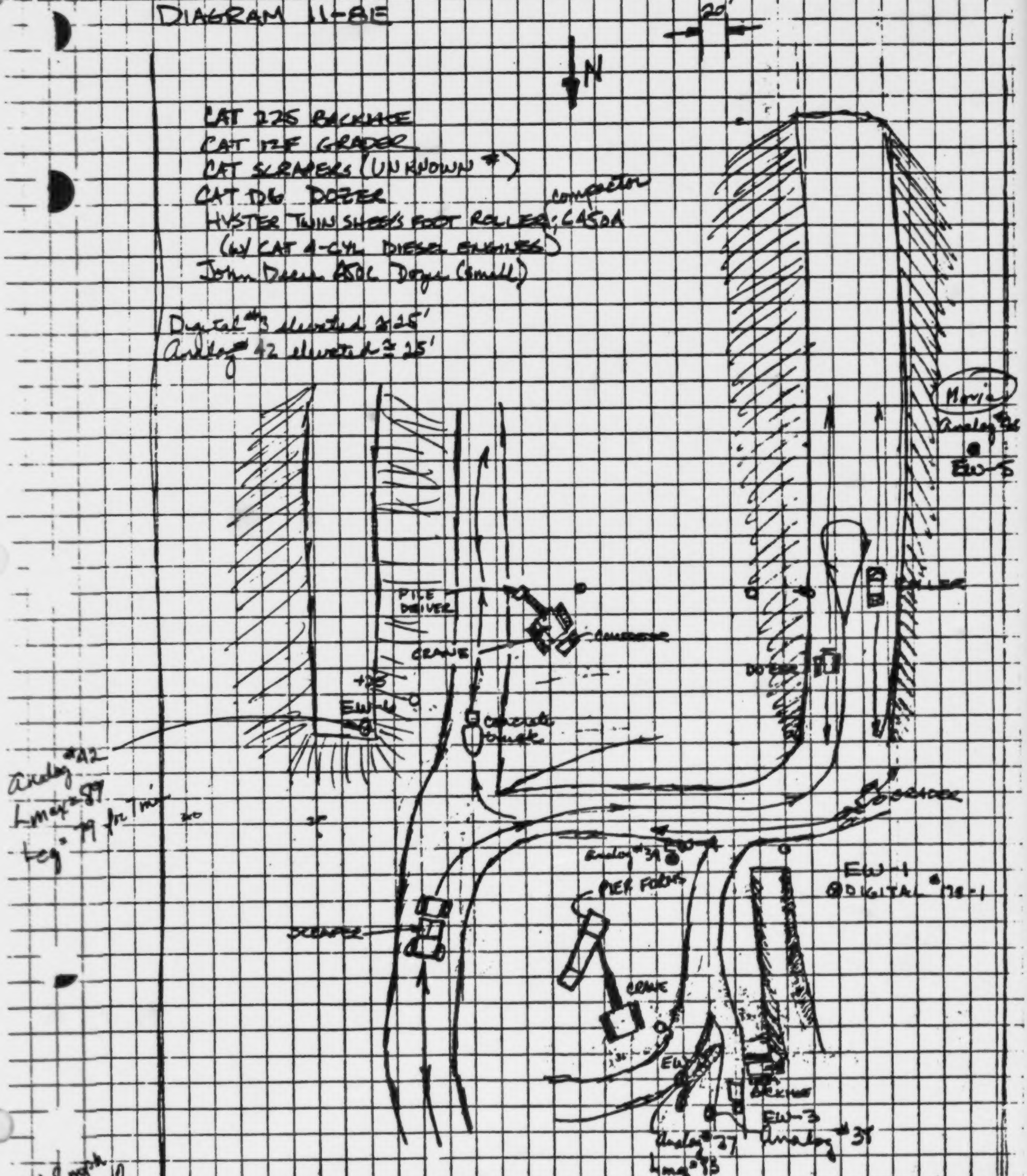
Sample	Location	Date	Equipment	L_{max} @ 50 ft.	L_{max} @ 37 ft.	L_{max} @ ___ ft.
47-41	EW-21	11-8	HYSTER TWIN ENGINE SHEEP'S FOOT COMPACTOR	87	↓	
-39	EW-4	11-9	SCRAPER PASSBY: LOADED	–	86	
-39	EW-4	11-9	SCRAPER PASSBY: UNLOADED	84	–	
-37	EW-2	11-8	HEAVY DUTY CRANE	74	–	
-38	EW-3	11-8	CAT 225 BACKHOE*	86	–	

*

DIAGRAM 11-8E

CAT 225 BACKHOE
CAT 12F GRADER
CAT SCRAPERS (UNKNOWN #)
CAT D6 DOZER
HYSTER TWIN SHEEPS FOOT ROLLERS; compactor C450A
(w/ CAT 4-CYL DIESEL ENGINES)
John Deere 450C Dozer (small)

Digital #3 elevated ≈ 25'
Analog #42 elevated ≈ 25'



At 8 mph
56/48
62

DIAGRAM 11-8F

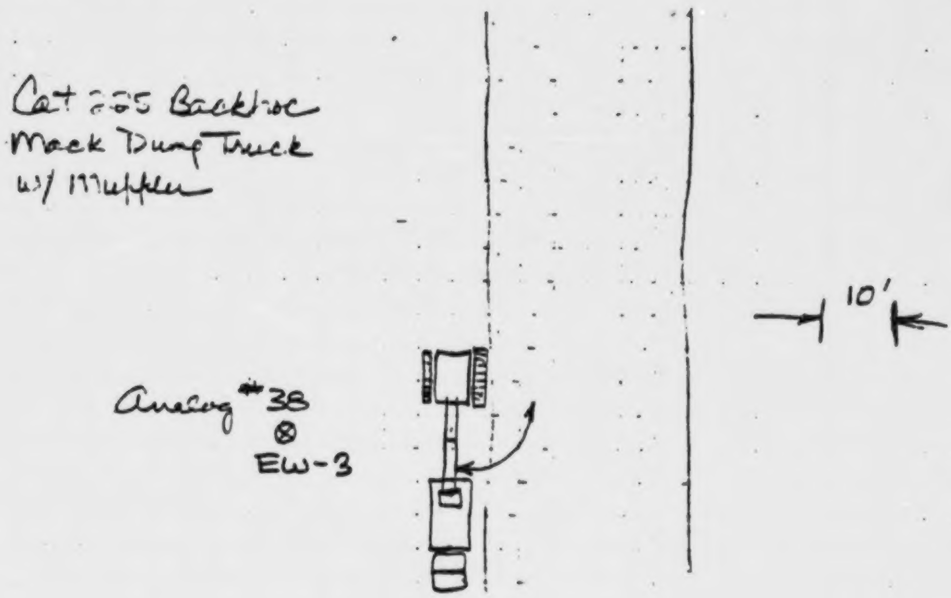


DIAGRAM 11-8G SCRAPER PASSBYS

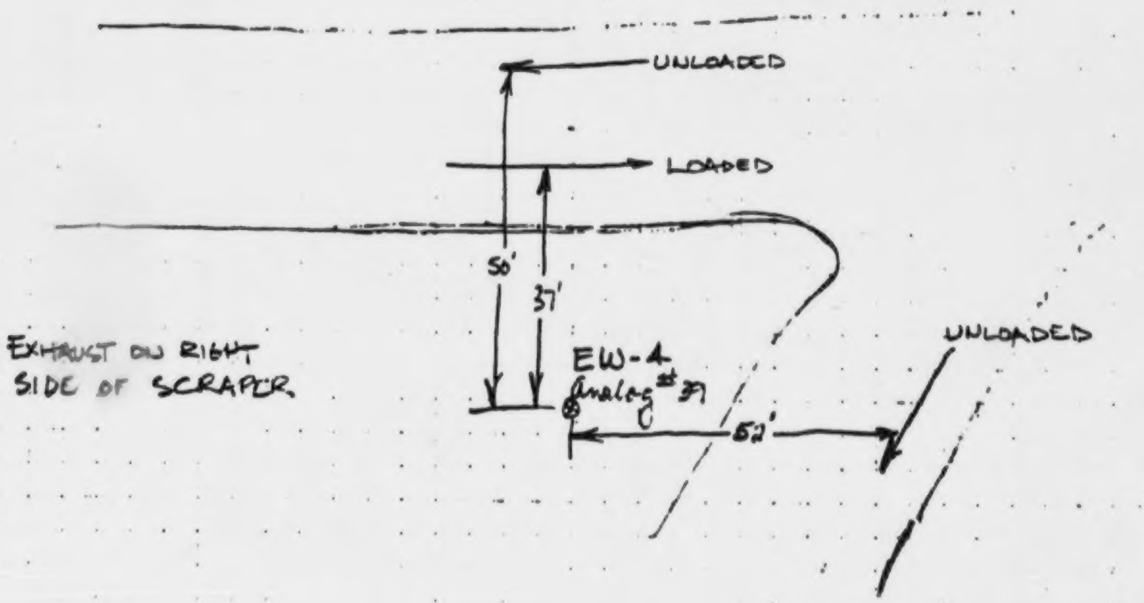


DIAGRAM 11-8H

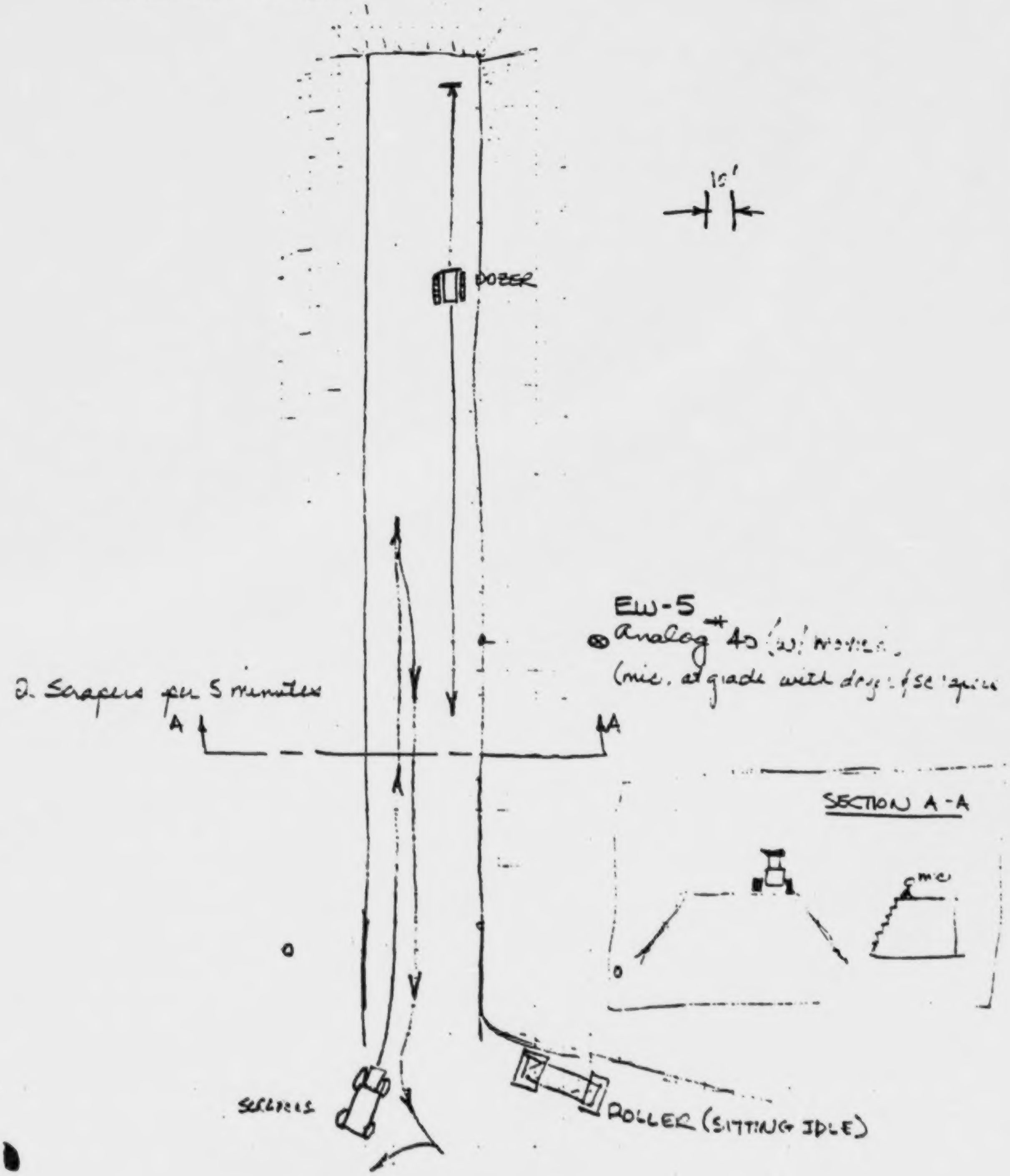
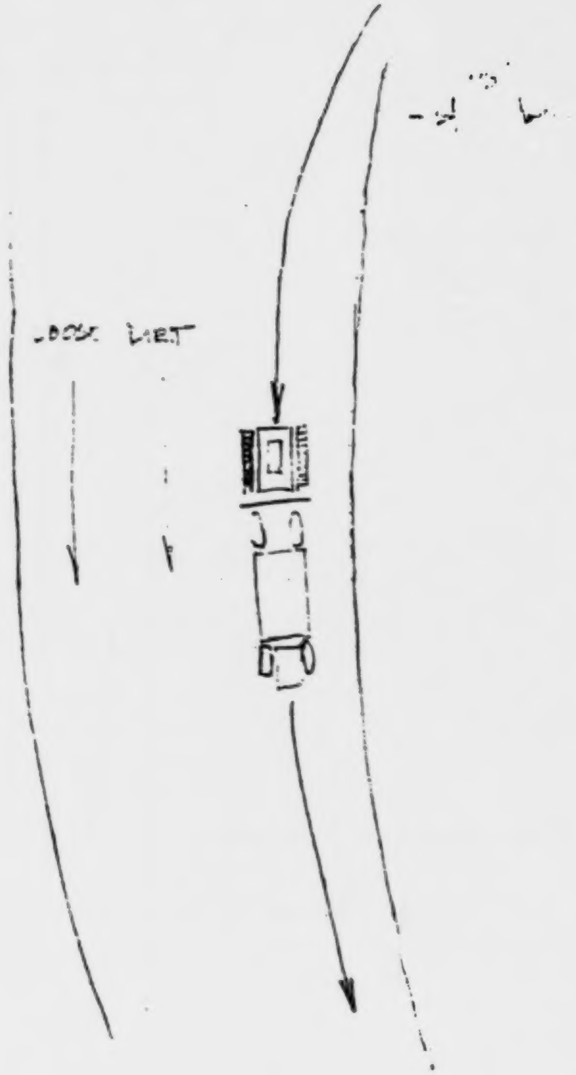


DIAGRAM 11-8I

SCRAPERS LOADING
w/ DOZER.

CAT D8H DOZER
CAT SCRAPERS (UNKNOWN).

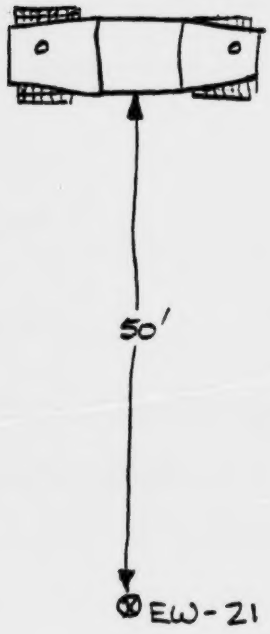


EW-7
Dualog #A3
⊗

Leq = 95 dB
Lmax = 95 dB

DIAGRAM 11-8J

HYSTER TWIN ENGINE
SHEEPS FOOT COMPACTOR
(SEE PHOTO #15, ROLL #2)



Measurement Site Data

Highway: I-95/395 **Date:** Nov 1979

Site Location: Earthwork Site II; general excavation

Type of Measurements:

☐ Community	☑ Activity	☐ Propagation
☐ Site Boundary	☐ Single Equipment	☐ Movies

Soil/Terrain Conditions: Level, loosely compacted in the vicinity of the microphone; concrete slab 30' from microphone, loose dirt in vicinity of dozer

Machinery Description:

Cat 951B Track Loader

Miscellaneous Information:

Loader was working alone, excavating dirt from South end of site and moving to stockpile at north end of site.

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov 1979

SITE LOCATION: Earthwork Site II

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-5	EW-8	11-5	1600	:09	11-5D	Dozer working alone, moving dirt	✓

ACTIVITY NOISE MEASUREMENTS

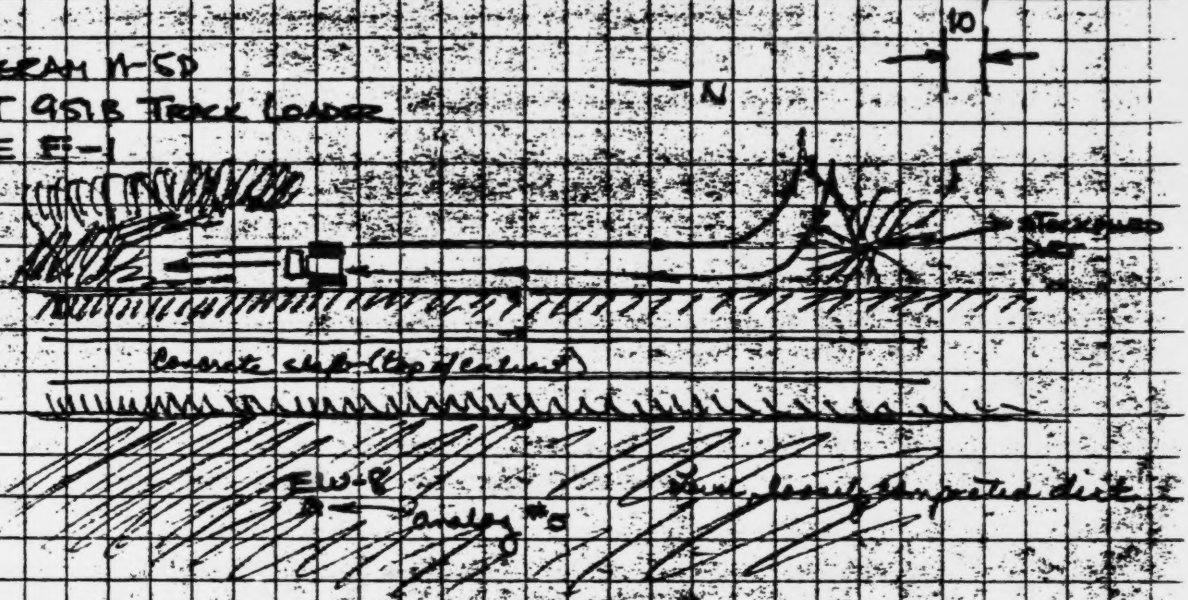
HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork Site II

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_1
45-5	EW-8	11-5	:09	75.2	66	70	75	78	79

DIAGRAM IV-5D
CAT 951B TRACK LOADER
SITE E-1


10
N
Stockpiled dirt
Concrete slab (top of culvert)
EW-8
Analog #5
[illegible] loosely compacted dirt

Measurement Site Data

Highway: I-95/395 **Date:** Nov. 1979

Site Location: Earthwork Site III - Excavation for box culvert (Blvd. Project)

Type of Measurements:

☑ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☐ Single Equipment ☐ Movies

Soil/Terrain Conditions: Flat, loosely compacted dirt. No structures within 100' of mic.

Note: Dumptrucks always operated at low speed on site

Machinery Description:

Koehring 666 Backhoe
Mack Single-Chassis 10-wheel dump trucks
Komatsu D75S Track Loader
Cat D6C Dozer
Koehring 1066 Backhoe
Bucyrus-Erie 20H Backhoe
Mack Water Truck w/ loud gasoline pump

Miscellaneous Information:

Backhoe was excavating large hole for box culvert. Backhoe would load truck, then sit idle waiting for next truck.

{ 9 scoops to fill 1 truck; time = 5 minutes
{ 3 trucks in 30 minutes

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork Site III

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-10	EW-9	11-6	1030	:08	11-6D	Backhoe excavating for box culvert	✓
-11	EW-10	11-6	1045	:08	11-6E	Loading working to free stuck dozer; one truck passed during sample	✓
-12*	EW-11	11-6	1100	:07	11-6F	Track loader filling dump truck	✓
158-3	EW-12	11-9	0845	7:05	11-9A	Community measurement; west edge of box culvert excavation	✓
47-47	EW-13	11-12	N/A	:03	11-12D	Water truck passby: L_{max} = 95dB@22'	✓

*See Earthwork Site IX for comparison of different equipment performing similar task

SITE BOUNDARY/COMMUNITY NOISE MEASUREMENTS

HIGHWAY: I-95/395 DATE: Nov. 1979

SITE LOCATION: Earthwork Site III

Sample	Location	Date	Dur.	L_{eq}
158-3	EW-12	11-9	7:05	81.8

ACTIVITY NOISE MEASUREMENTS

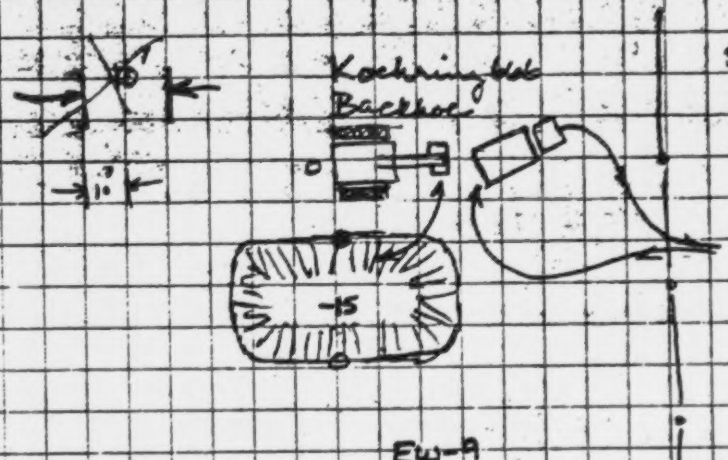
HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork III

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_{1}
45-10	EW-9	11-6	:08	77.0	66	67	77	80	81
-11	EW-10	11-6	:08	78.1	66	68	73	82	90
-12	EW-11	11-6	:07	76.3	64	66	73	80	80
-47	EW-13	11-12	:03	80.4	57	64	70	85	92

DIAGRAM 11-6D



9 scoops
5 minutes } TO FILL ONE TRUCK

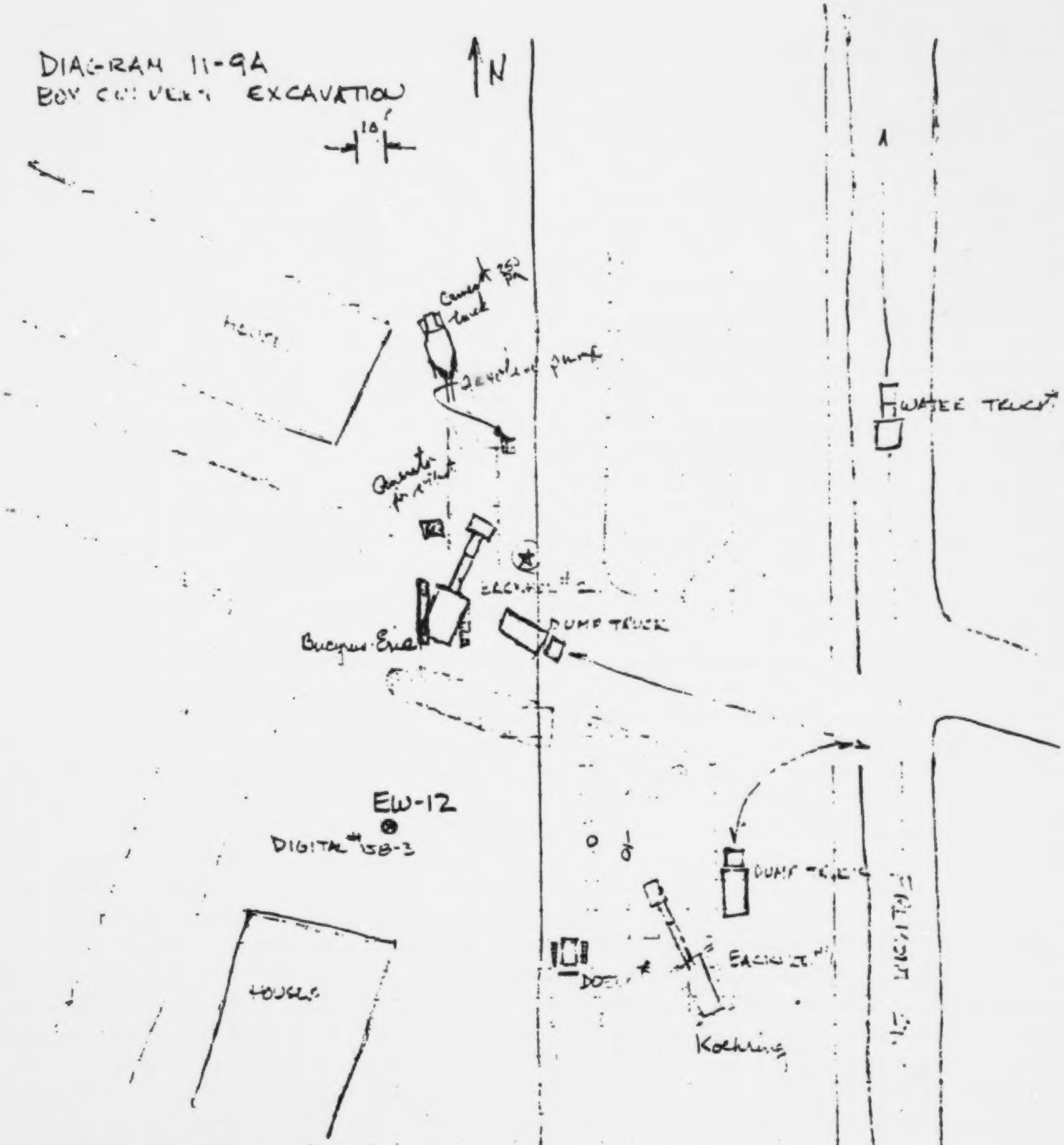
3 TRUCKS IN 30 MINUTES

EW-9
○ ⊗ Analog #10 (70 feet from rear side of backhoe)

Audio { L_{eq} = 80dB for 5 min
L_{max} = 83dB

NOTE: L_{max} during idle = 68 dB

DIAGRAM 11-9A
BOX CULVERT EXCAVATION

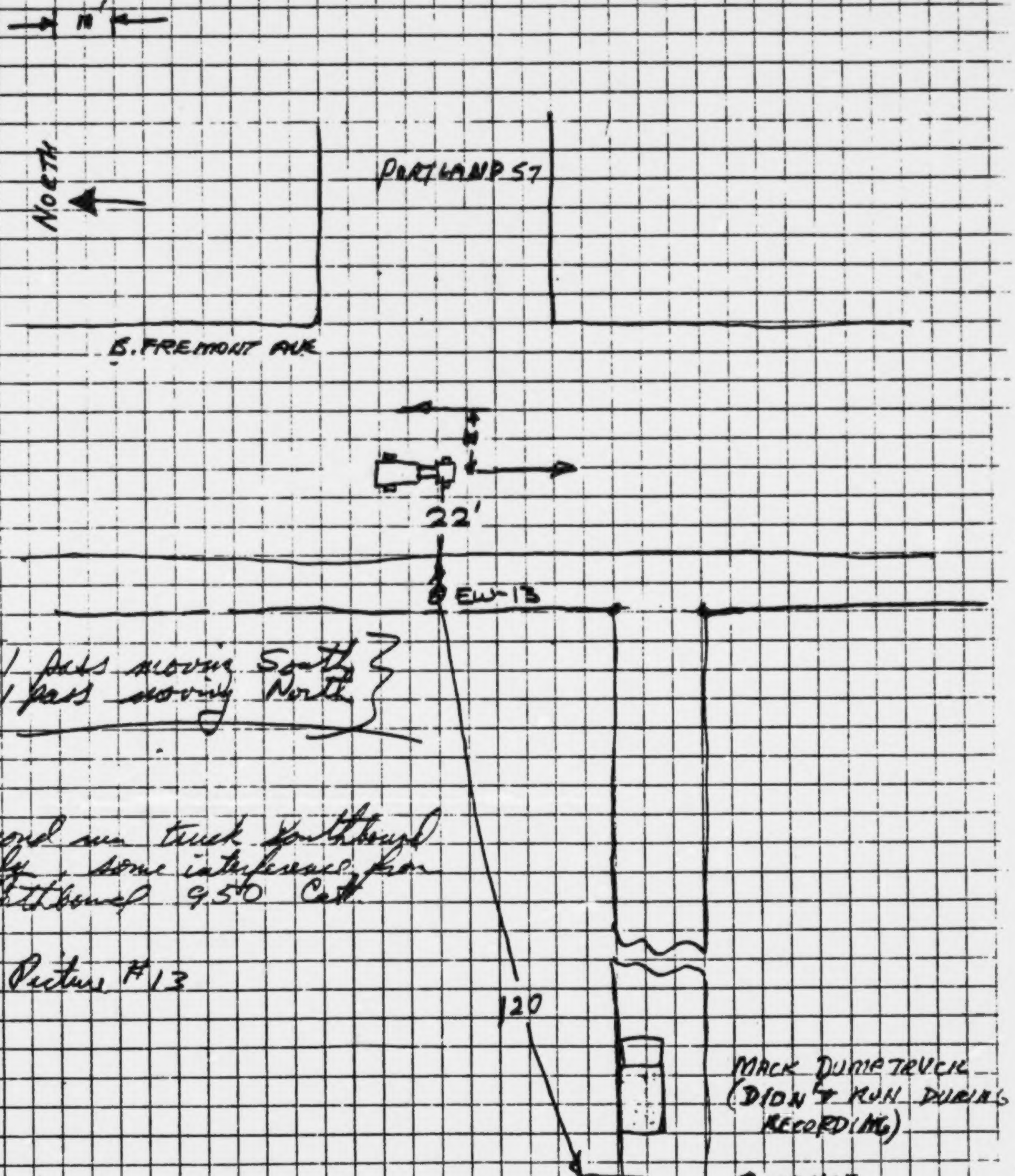


Backhoe #1 : Koehring 1066
Backhoe #2 : Bucyrus-Erie 20-H
• Dump Trucks w/ mufflers
Cat D6C Dozer

*Water truck w/ loud pump makes occasional slow passings on street
+ Dozer not operating when sample was started
★ Cement truck cruising in this area noted at 2:10 PM

37

DIAGRAM H-42C WATER TRUCK PASS-BY
ANALOG 47



{1 pass moving South
1 pass moving North}

second run truck Southbound only, some interference from Northbound 950 Cat.

Picture #13

DIAGRAM 11-6E → N

KOMATSU D755 TRACKLOADER & CAT D6C DOZ

10'

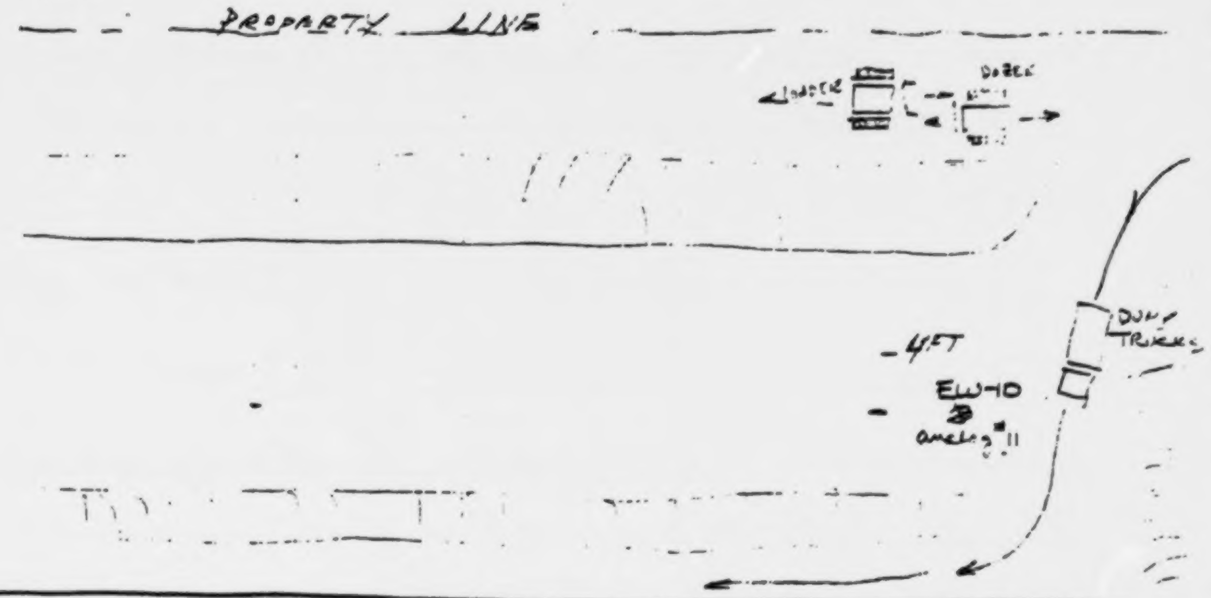
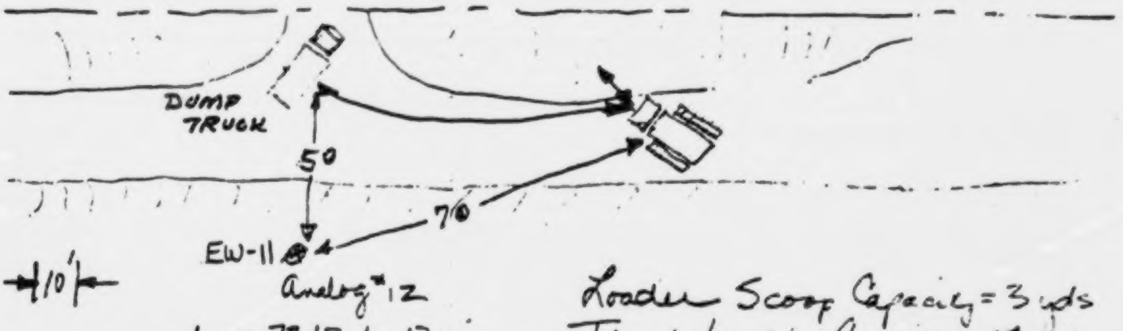


DIAGRAM 11-6F KOMATSU D755 TRACK LOADER



Leq = 73dB for 13 min
Lmax = 86dB

Loader Scoop Capacity = 3 yds
Truck hauling Capacity = 14 yds

4 Scoops to fill each Truck

Measurement Site Data

Highway: I-95/395

Date: Nov. 1979

Site Location: Earthwork Site IV - Trenching and Pipelaying

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☐ Single Equipment ☐ Movies

Soil/Terrain Conditions: Flat terrain. Buildings approx. 75' east of site

Machinery Description:

1 Koehring 466 Backhoe
1 Cat. 950 Front End Loader
Mack Dump trucks

Miscellaneous Information:

- Front End Loader alternated between loading dirt into trucks (on east side) and filling the trench with gravel (on the west side).
- Backhoe did trenching and pipelaying

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork Site IV

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-36	EW-14	11-8	1105	:20	11-8D	Trenching/Pipelaying	✓

ACTIVITY NOISE MEASUREMENTS

HIGHWAY: I-95/395

DATE: Nov. 1979

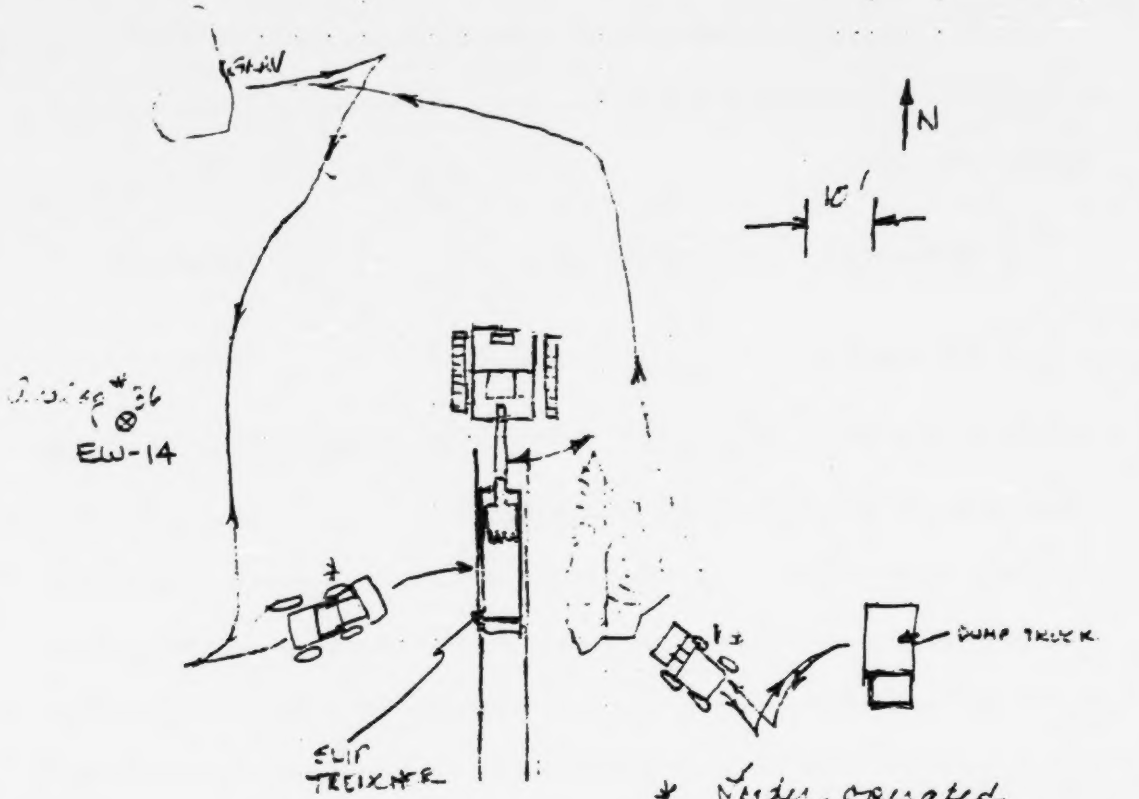
SITE LOCATION: Earthwork Site IV

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_1
45-36	EW-14	11-8	:20	81.1	69	71	75	87	89

DIAGRAM 11-8D

STORM DRAIN TRENCHING
AND PLACEMENT

1 KOEHRING 466 BACKHOE
1 CAT 950 FRONT END LOADER



* Loader operated on both sides of trench

$L_{MAX} = 80$

$L_{eq} = 79.1$, 20 min

* Backhoe is relatively old

Measurement Site Data

Highway: I-95/395 **Date:** Nov. 1979

Site Location: Earthwork V - Finish grading next to concrete roadway

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☐ Single Equipment ☐ Movies

Soil/Terrain Conditions: Level; concrete roadbed between dozer and microphone

Machinery Description:

Cat. D6 Dozer (with degraded muffler)

Miscellaneous Information:

Dozer moved back and forth in front of microphone, leveling loose dirt next to concrete roadbed. Distance of dozer to mic. varied from 50' to 75'

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork Site V

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-16	EW-15	11-6	1500	:06	11-6I	Dozer performing finish grading	✓

ACTIVITY NOISE MEASUREMENTS

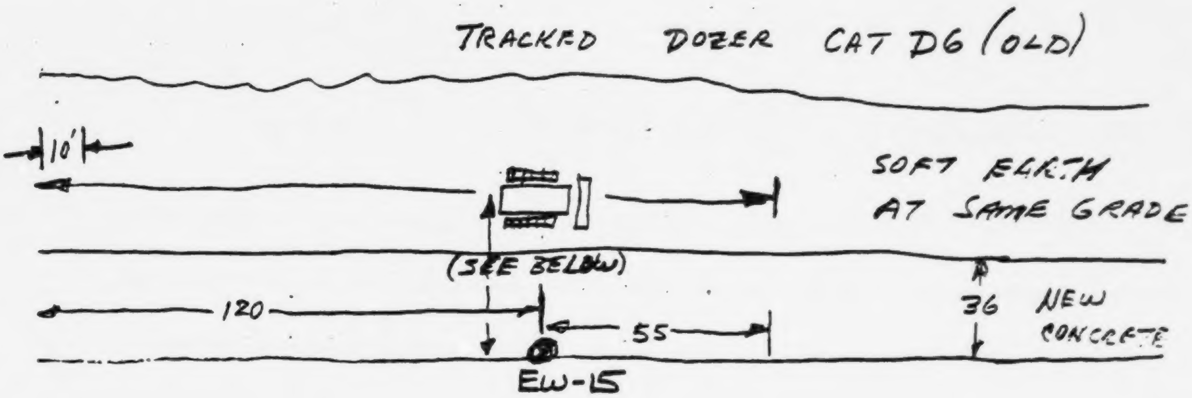
HIGHWAY: I-95/395

DATE: Nov 1979

SITE LOCATION: Earthwork Site V

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_{1}
47-16	EW-15	11-6	:06	79.7	69	72	76	84	89

DIAGRAM 11-6 I



NOTE: DISTANCE VARIED BETWEEN MIC & EQUIPMENT FROM 50' TO 75'

L_{max} = 88 L_{eq} = 80 FOR 7 MIN

ANALOG # 16

* SIGNIFICANT TRACK SQUEEL

Measurement Site Data

Highway: I-95/395

Date: Nov. 1979

Site Location: Earthwork Site VI - Concrete Pour on Box Culvert Structure

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☐ Single Equipment ☐ Movies

Soil/Terrain Conditions:

Machinery Description:

Mack DM-600 Concrete Trucks with straight stacks

Concrete conveyor using 4-cylinder engine

Small gasoline generator powering a concrete vibrator

Miscellaneous Information:

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork Site VI

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-17	EW-16	11-6	1440	:17	11-65	Concrete pour at box culvert	✓

ACTIVITY NOISE MEASUREMENTS

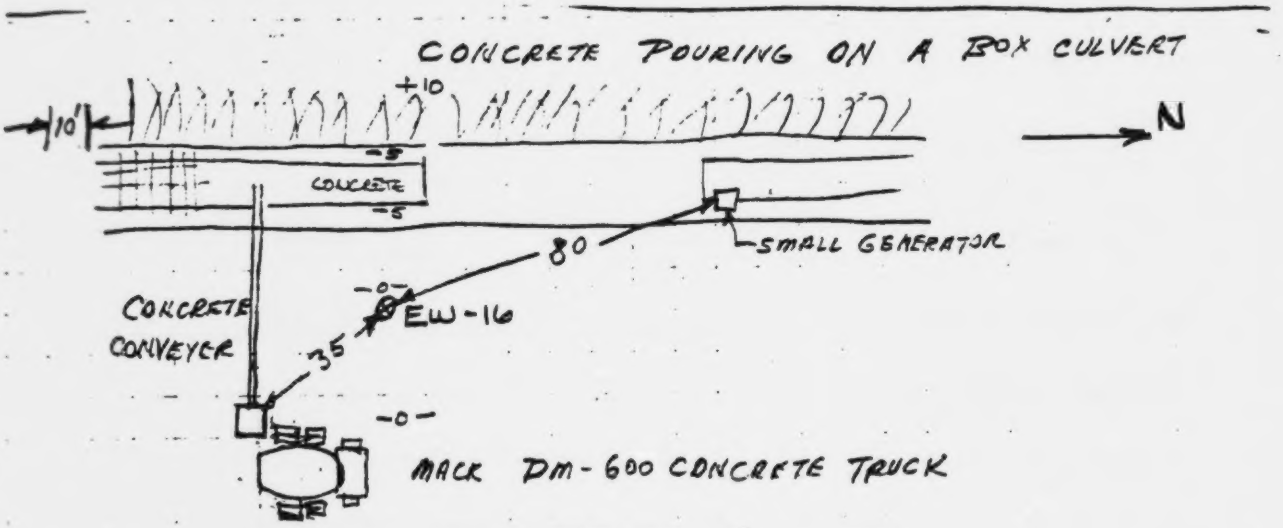
HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork VI

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_{1}
47-17	EW-16	11-6	:17	75.1	69	71	74	77	82

DIAGRAM 11-6J



LMAX = 84 Leq = 77 FOR 6 MINUTES
ANALOG #17
NOTE: THE MUFFLER FROM 4CYL ENGINE OF THE CONCRETE CONVEYER WAS POINTED DIRECTLY AT THE MICROPHONE

Measurement Site Data

Highway: I-95/395

Date: Nov. 1979

Site Location: Earthwork Site VII - Backfilling a culvert using backhoe

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☐ Single Equipment ☐ Movies

Soil/Terrain Conditions: Flat terrain, cleared of all trees, etc.

Machinery Description:
Cat. 225 Backhoe

Miscellaneous Information:

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork Site VII

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-30	EW-17	11-7	1555	:05	11-7H	Backhoe backfilling culvert hole	✓

ACTIVITY NOISE MEASUREMENTS

HIGHWAY: I-95/395

DATE: Nov. 1979

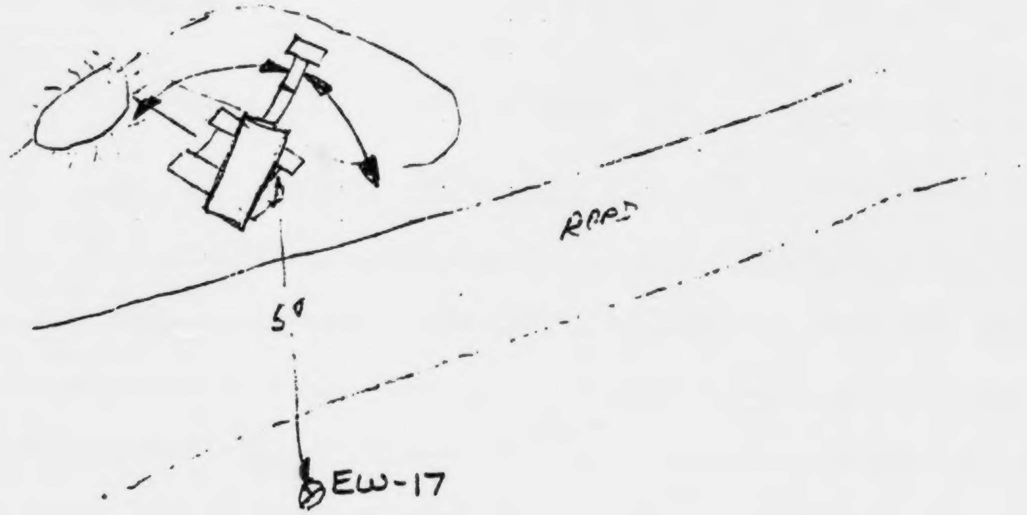
SITE LOCATION: Earthwork Site VII

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_{1}
47-30	Ew-17	11-7	:05	82.5	74	80	83	84	86

DIAGRAM 11-7H

BACK HOE CAT 225
BACK FILLING OF CULVERT

ANALOG 30



Measurement Site Data

Highway: I-95/395

Date: Nov. 1979

Site Location: Earthwork Site VIII - Backhoe digging Trench for drainage pipe

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☐ Single Equipment ☐ Movies

Soil/Terrain Conditions: Relatively flat area along Blvd. project site boundary. High-rise apartment adjacent to measurement site

Machinery Description:

P&H Backhoe (model # unknown)

Miscellaneous Information:

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork Site VIII

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-18	EW-18	11-6	1500	:06	11-6K	Trenching operation; backhoe working alone	✓
-19	EW-19	11-6	1515	:06	11-6K	Same as #18	✓

ACTIVITY NOISE MEASUREMENTS

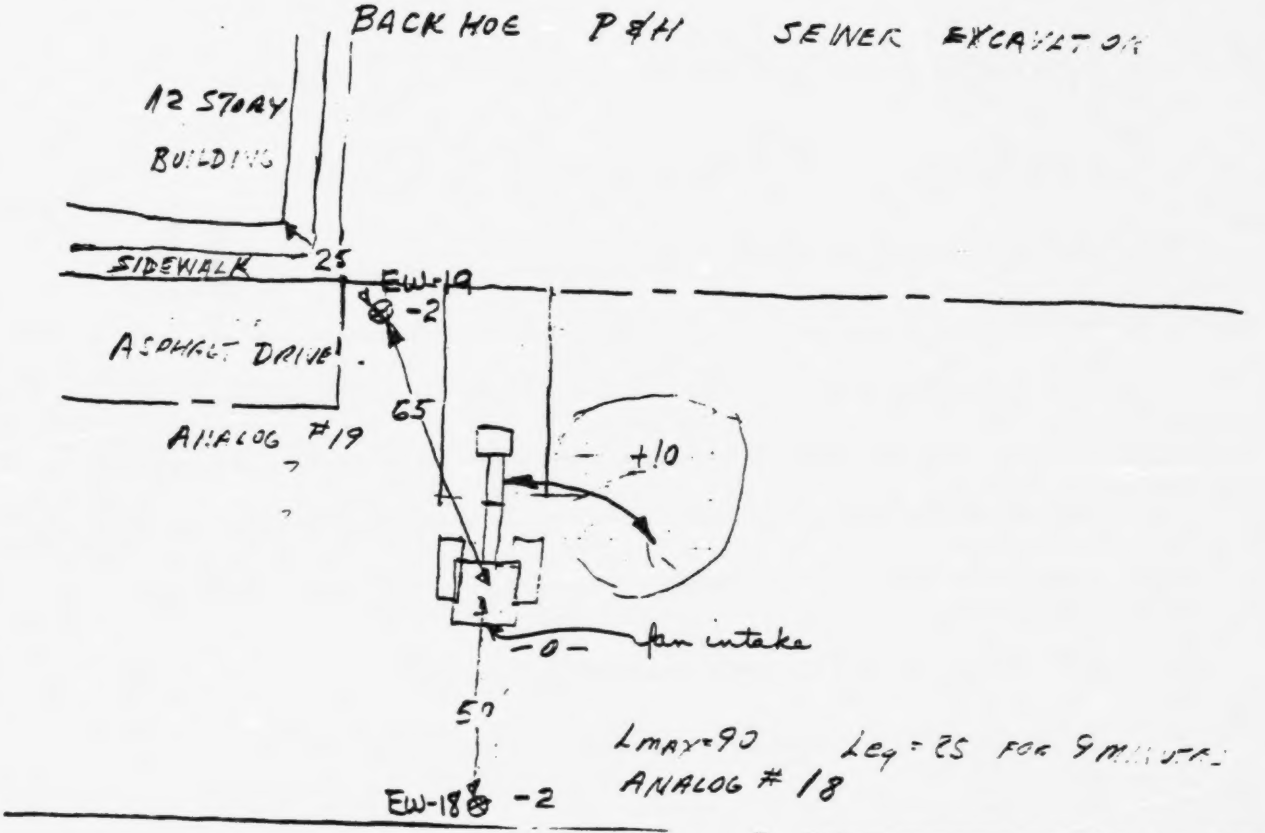
HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork Site VIII

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_1
47-18	EW-18	11-6	:06	89.1	84	86	89	91	93
-19	EW-19	11-6	:06	84.8	78	80	84	87	90

DIAGRAM 11-6K



Measurement Site Data

Highway: I-95/395

Date: Nov. 1979

Site Location: Earthwork Site IX - Loading of demolished pavement for transport

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☐ Single Equipment ☐ Movies

Soil/Terrain Conditions: Flat terrain

Machinery Description:

Cat 983 track loader

Mack Single Chassis dump truck with straight stack

Miscellaneous Information:

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Earthwork Site IX

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-46*	EW-20	11-12	1045	:16	11-12F	Loading of broken pavement	✓

* See Earthwork Site III, Sample 47-12 for comparison of different equipment performing similar task

ACTIVITY NOISE MEASUREMENTS

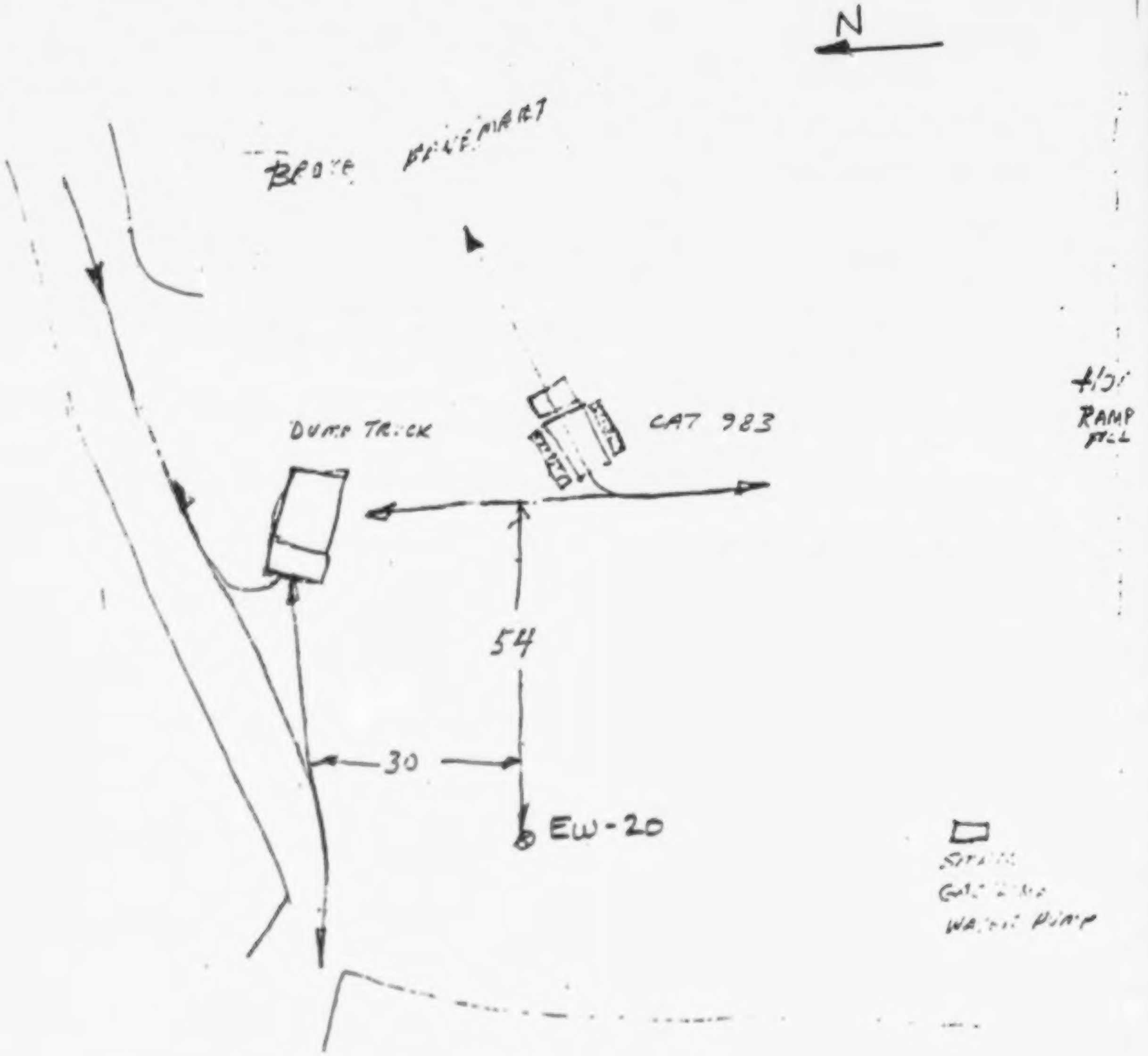
HIGHWAY: I-95/395

DATE: Nov 1979

SITE LOCATION: Earthwork Site IX

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_1
47-46	EW-20	11-12	:16	75.4	67	67	69	80	85

DIAGRAM 11-12B PAVEMENT LOADING AT
ANALOG 46 FILL AREA FOR BLVD ON RAMP



METROSONICS
Lmax = 89 Leq = 74 FOR 5 MIN.

Measurement Site Data

Highway: I-95/395

Date: Nov. 1979

Site Location: Paving Site I - Single lane concrete paver

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☐ Single Equipment ☐ Movies

Soil/Terrain Conditions: 2 lanes of concrete exist between paver and microphone; small embankment directly in front of mic.

Machinery Description:

Blaw-Knox Single lane paver
Mack Concrete Trucks with straight stack.

Miscellaneous Information:

DATA LOG SUMMARY

HIGHWAY: I-95/395

SITE LOCATION: Paving Site I

DATE: Nov. 1979

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-14	P-1	11-6	1340	:04	11-614	Paving operation; concrete trucks are primary source	✓
-15A	P-2	11-6	1350	:04	11-614	Paving operation	✓

ACTIVITY NOISE MEASUREMENTS

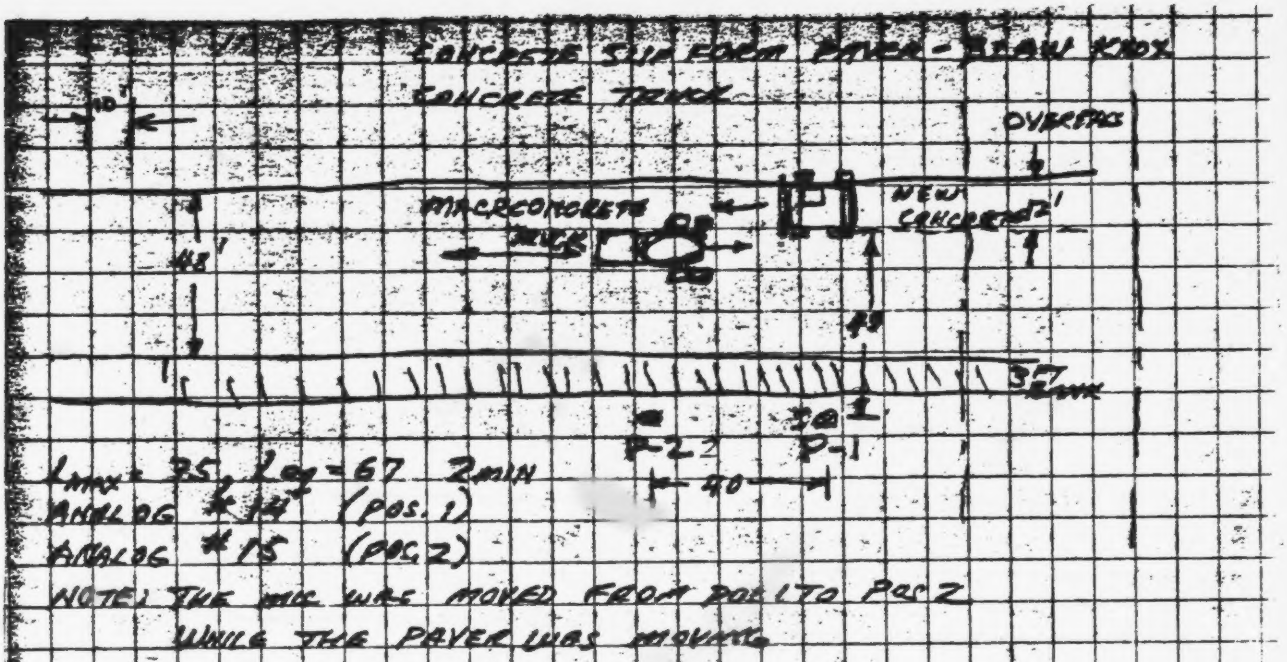
HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Paving Site I

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_1
47-14	P-1	11-6	:04	70.2	65	67	68	71	79
-15A	P-2	11-6	:04	76.3	61	63	69	81	83

DIAGRAM 11-6H



Lmax = 75, Leq = 67 2MIN
ANALOG #14 (POS. 1)
ANALOG #15 (POS. 2)
NOTE: THE MIC WAS MOVED FROM POS 1 TO POS 2
WHILE THE PAVER WAS MOVING

Measurement Site Data

Highway: I-95/395 Date: Nov. 1979

Site Location: Paving Site II - Asphalt paving

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☐ Single Equipment ☐ Movies

Soil/Terrain Conditions: Flat, paved surfaces in vicinity of microphone

Machinery Description:

Barber-Greene Asphalt Spreader
Dynapac 42A Vibratory Roller (dual rollers)
Mack dump-trucks with mufflers

Miscellaneous Information:

1. First run of spreader: 40 ft. from mic.
2. Second run of spreader: 52 ft from mic. (backing)
3. Roller made passes at various distances from 34 to 43 feet from mic.

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Paving Site II

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-48	P-3	11-12	N/A	:21	11-12D	Asphalt paver and roller	✓

ACTIVITY NOISE MEASUREMENTS

HIGHWAY: I-95/395

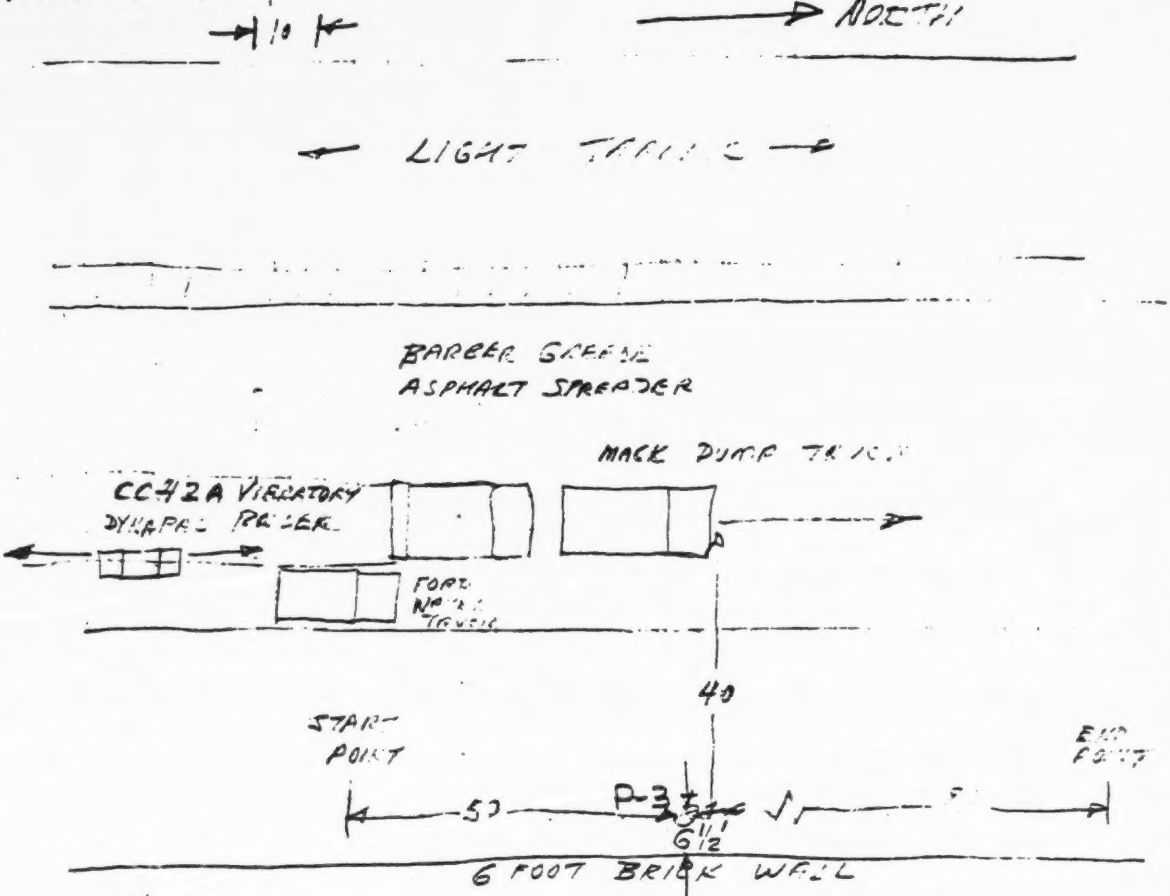
DATE: Nov 1979

SITE LOCATION: Paving Site II

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_{1}
47-48	P-3	11-12	:21	79.9	67	70	78	84	87

DIAGRAM 11-12 D ASPHALT PAVING — BLVD [illegible]

ANALOG 48



Pictures [illegible], 16 (Roller)

NOTE 1. First run of spreader at 40 foot [illegible]
2. Second run of spreader at 52 foot [illegible] (Pi[illegible])
3. THE ROLLER MADE PASSES AT VARIOUS D[illegible]
FROM 34 TO 43 FEET FROM [illegible]

Measurement Site Data

Highway: I-95/395 Date: Nov. 1979

Site Location: Bridge Site I - Demolition of concrete slab; pile driving

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☐ Single Equipment ☐ Movies

Soil/Terrain Conditions: Flat terrain; gravely compacted, damp soil.

Machinery Description:

2 Ingersoll-Rand "Whisperized" 185 CFM Compressors

2 Chicago-Pneumatic 80-pound jackhammers

1 Fumetractor H-8 w/ pneumatic breaker mounted on the rear

1 Crane-mounted pile driver

Miscellaneous Information:

DATA LOG SUMMARY

HIGHWAY: I - 95/395

DATE: Nov. 1979

SITE LOCATION: Bridge Site I

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47 - 1	B-1	11-5	1420	:10	11-5A	Activity measurements: both compressors and jackhammers operating	✓
- 2	B-2	11-5	1435	:10	11-5A	Activity measurements: both compressors and jackhammers operating.	✓
- 27	B-3	11-7	0900	:09	11-7E	Tractor-mounted breaker working with jackhammers	✓
- 20	B-4	11-6	1615	:11	11-6L	Pile driver: 49 impacts per minute	✓
158 - 2	B-5	11-8	0935	7:10	11-8B	Pile driver long-term measurement	✓

SITE BOUNDARY/COMMUNITY NOISE MEASUREMENTS

HIGHWAY: I-95/395 DATE: Nov. 1979

SITE LOCATION: Bridge Site I

Sample	Location	Date	Dur.	L_{eq}
158-2	B-5	11-8	7:10	76.6

ACTIVITY NOISE MEASUREMENTS

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Bridge Site I

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_1
47-1	B-1	11-5	:10	85.8	72	73	84	89	91
-2	B-2	11-5	:10	85.0	74	75	85	88	89
-27	B-3	11-7	:09	93.4	84	85	94	95	96
-20	B-4	11-6	:11	89.5	77	79	87	94	96

Diagram II-5A

Site D-1

Demolition of Concrete Slab

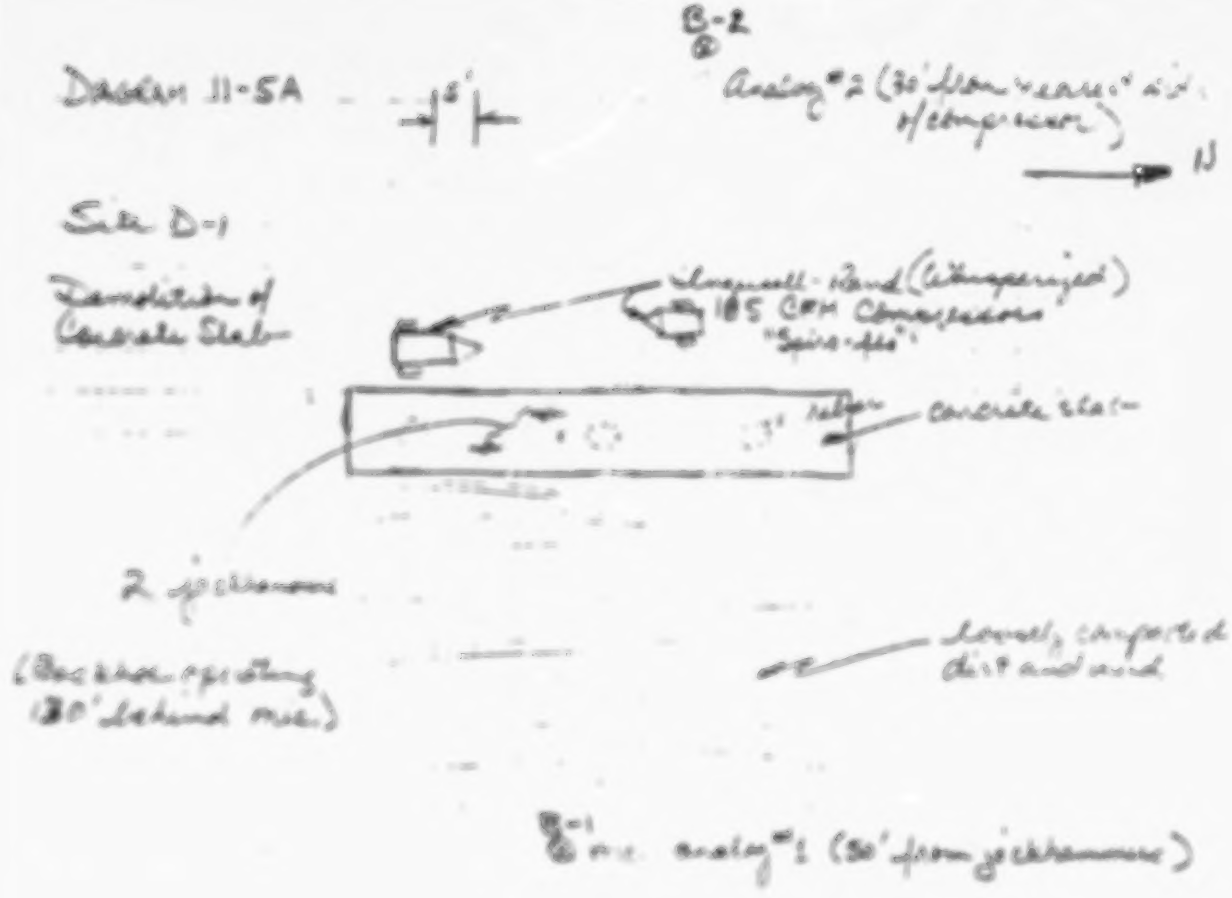
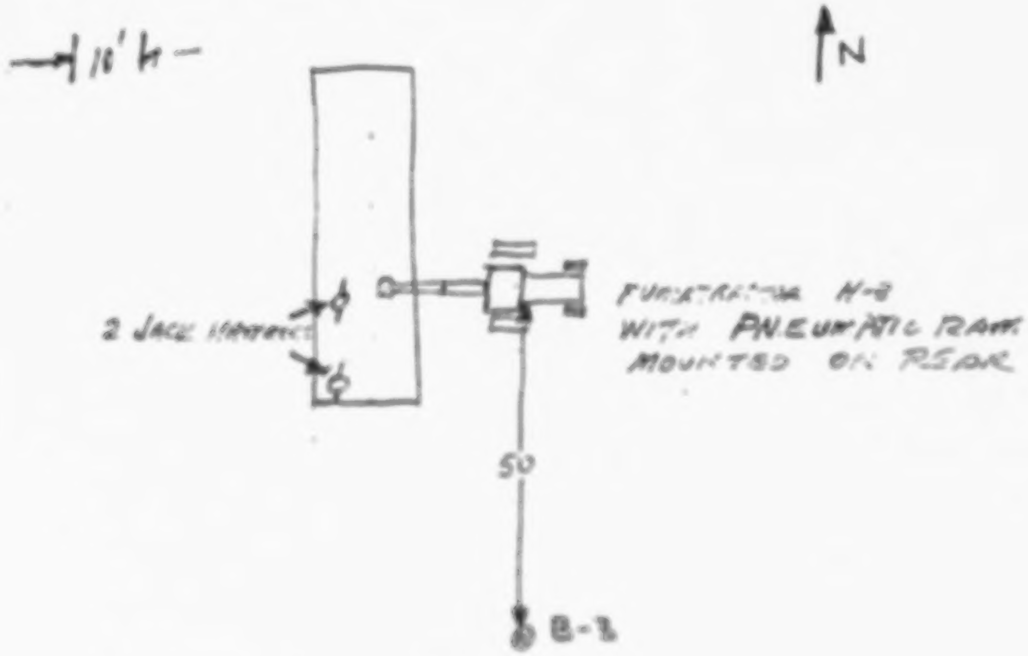

5'
B-2
Analog #2 (30' from rear side of compressor)
N
Ingersoll-Rand ([illegible]) 185 CFM Compressor "Spiro-flo"
rebar
concrete slab
2 jackhammers
(Backhoe operating 130' behind mic.)
loosely compacted dirt and sand
B-1 mic. analog #1 (30' from jackhammers)

DIAGRAM 11-7E
SITE D1

AIRLOG #27

CONCRETE FOUNDATION REMOVAL
WITH JACK HAMMERS & PNEUMATIC HAMMER



[illegible]

PILE DRIVER: 49 IMPACTS PER MINUTE

ANALOG #20
Lmax = 88
Leq = 83
for 8 min

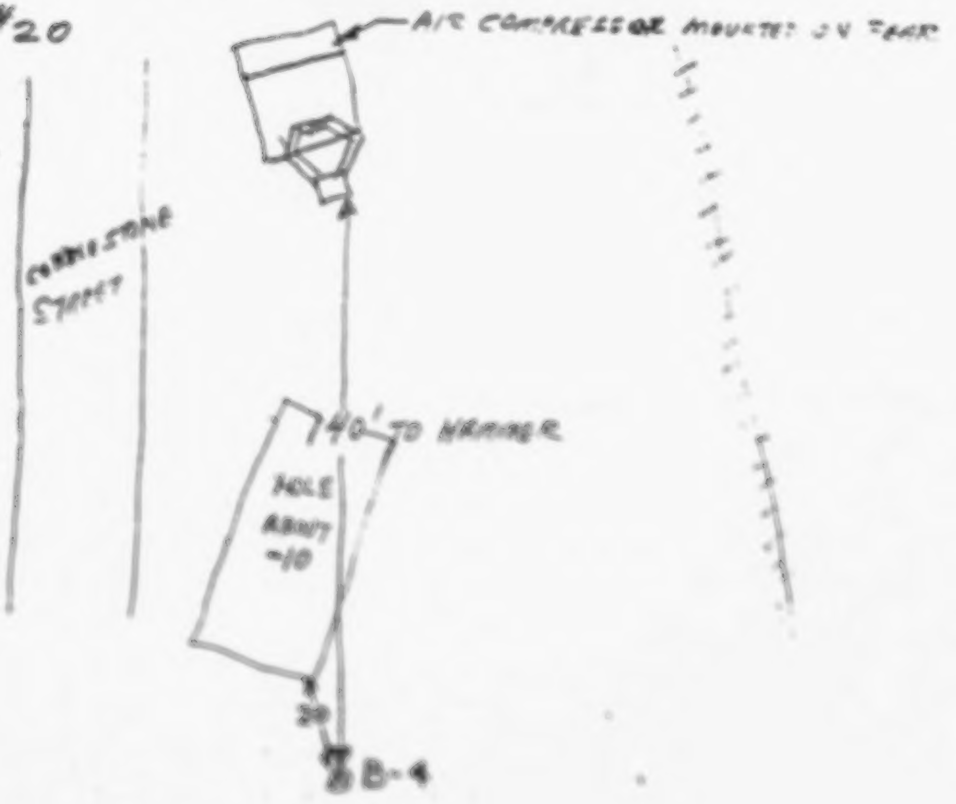
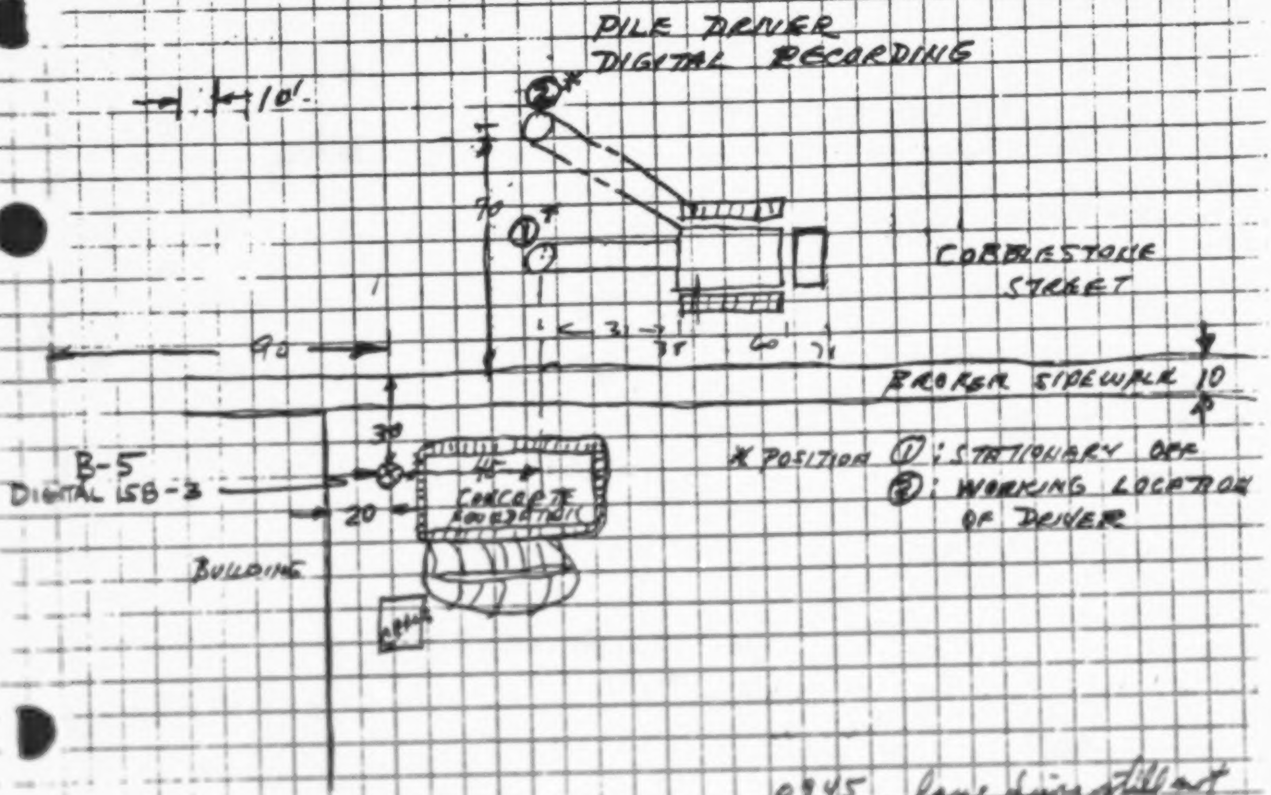


DIAGRAM 11-BB



0945 large drive still not working - crane moving wood forms from area of concrete foundation

NOTE: PILE DRIVER START UP
AT 9:35 a

Measurement Site Data

Highway: I-95/395

Date: Nov. 1979

Site Location: Bridge Site II - bridge pier concrete pour

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☐ Single Equipment ☐ Movies

Soil/Terrain Conditions: Flat terrain; street bordered north edge of site. 3-story building along west edge of site.

Machinery Description:

Koehring 665 heavy crane
Case 580C Tractor with tamper
Mack cement trucks w/ straight stacks
Cement vibrator w/ generator

Miscellaneous Information:

Cement trucks would pull onto the site, then mix their load of cement. Truck would then pull into position, load concrete into concrete bucket. Crane would lift bucket to the top of pier formwork. Vibrator was operated while concrete was being poured.

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Bridge Site II

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-33	B-6	11-8	0955	:21	11-8C	Cement truck loading concrete bucket	✓
-34	B-7	11-8	1025	:09	11-8C	Tractor with tamper	✓
-35	B-8	11-8	1045	:21	11-8C	Trucks entering/leaving site; truck loading bucket	✓

ACTIVITY NOISE MEASUREMENTS

HIGHWAY: I-95/395 DATE: Nov. 1979

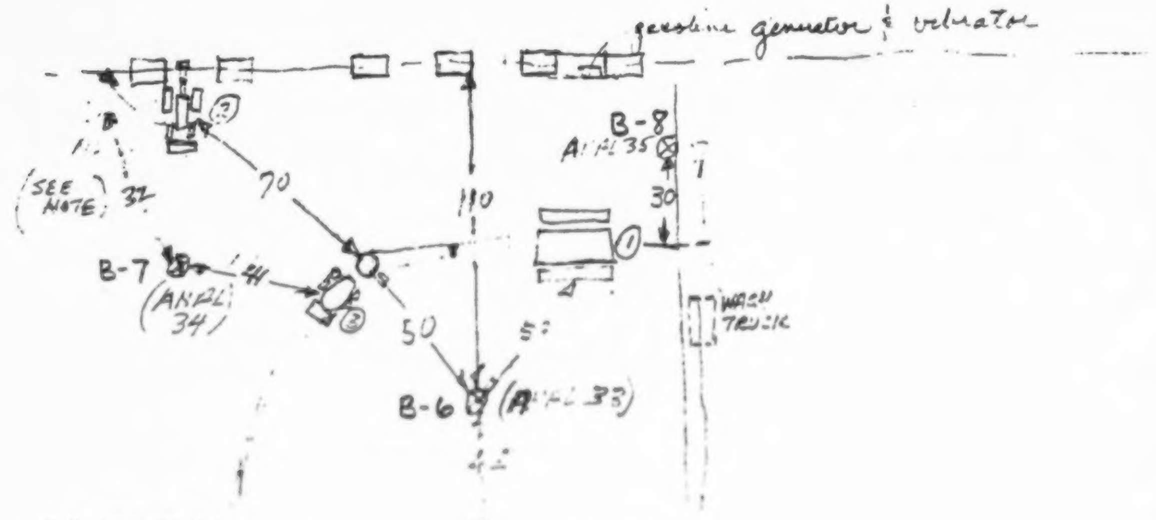
SITE LOCATION: Bridge Site II

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_1
47-33	B-6	11-8	:21	77.5	69	71	76	81	83
-34	B-7	11-8	:09	84.5	71	75	85	87	89
-35	B-8	11-8	:21	75.2	69	72	74	77	82

DIAGRAM 11-8C CONCRETE POURING

ANALOG 33
METROSONICS L MAX 85 Leq 78 FOR 22 MIN

→| |←10



EQUIPMENT:
1. KOEHRING 665 [illegible]
2. CAT 983 TRACTOR WITH TAMPER
3. MACK CEMENT TRUCK [illegible]

ANALOG 34
METROSONICS Lmax 89 Leq 85 FOR 12 MIN

NOTES:
1. TRACTOR WAS POSITIONED TO LEFT OF SURVEYOR 32' FROM MIC
2. TRACTOR THEN MOVED TO RIGHT OF MIC [illegible]
15' FROM MIC, THE TAMPER WAS APPROX 30' [illegible]
3. THE CONCRETE TRUCK DID NOT STOP TO WAIT

ANALOG 35
METROSONICS L MAX 88 Leq 76 FOR 14 MIN

NOTES:
1. TRUCKS DOZER STARTED LOADING AT [illegible]
WORK SITE

WEATHER [illegible] WIND 3-5 [illegible]

Measurement Site Data

Highway: I - 95/395

Date: Nov. 1979

Site Location: Bridge Site III - Steel girder erection

Type of Measurements:

☐ Community ☑ Activity ☐ Propagation

☐ Site Boundary ☐ Single Equipment ☐ Movies

Soil/Terrain Conditions:

Machinery Description:

2 P & H Heavy duty cranes

1 Heavy truck tractor/trailer carrying steel girder

Miscellaneous Information:

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Bridge Site III

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
17B-2	B-9	11-9	1145	3:45	11-9C	Steel girder erection with cranes	✓
15A-4	B-9	11-13	0915	5:45	11-9C	N/G: ACTIVITIES STOPPED BECAUSE OF RAIN	✓

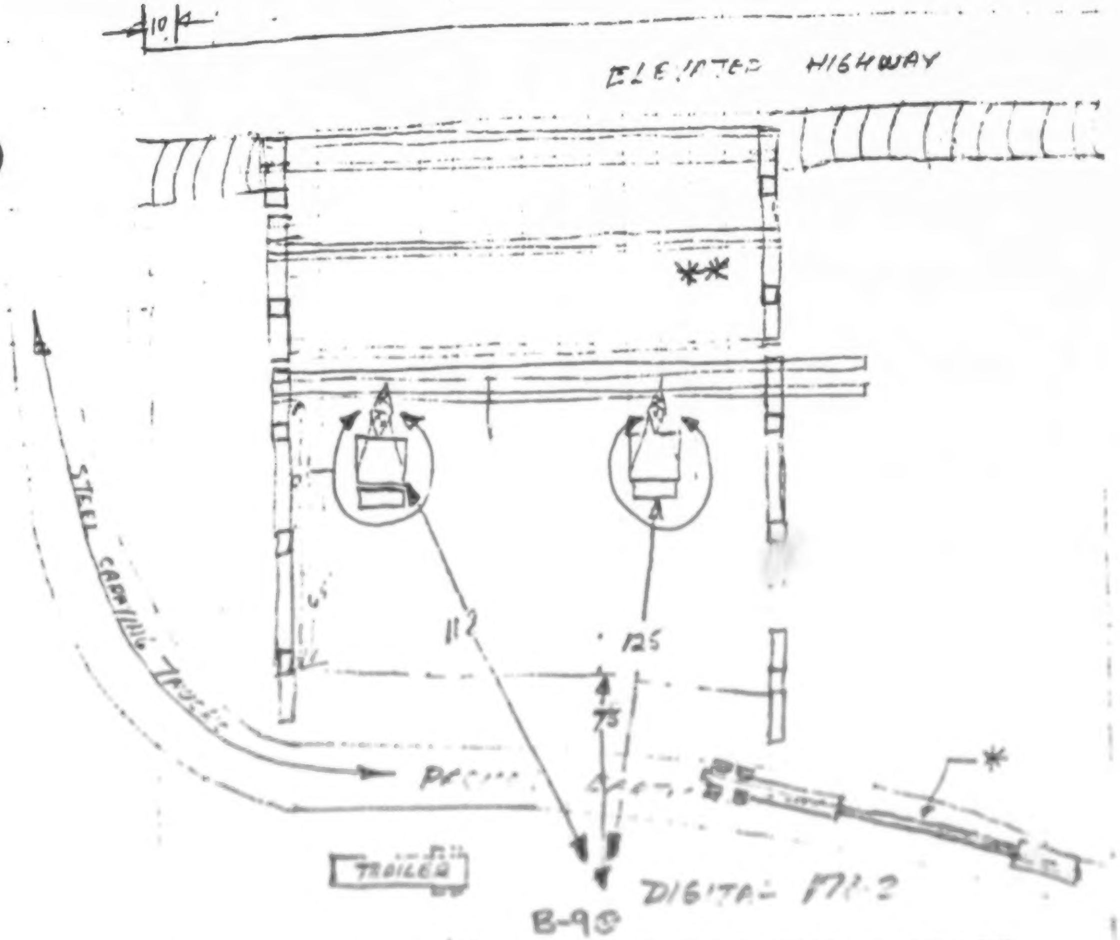
SITE BOUNDARY/COMMUNITY NOISE MEASUREMENTS

HIGHWAY: I-95/395 DATE: Nov 1979

SITE LOCATION: Dredge Site III

Sample	Location	Date	Dur.	L_{eq}
178-2	B-9	11-9	3:45	71.4
158-4	B-9	11-13	5:45	66.1 N/G

DIAGRAM 11-9C
OVERHEAD STEEL CONSTRUCTION



EQUIPMENT (2) P&H HEAVY DUTY CRANES

NOTE: AT END OF DAY STEEL PAINT [illegible]
AT ERECTION

TEST REPEATED 11-13 DIGITAL 158-4

* STEEL GIRDER ON TRAILER AT START OF TEST
** AT START THERE WERE 5 1/2 GIRDERS ON SECOND BAY

Measurement Site Data

Highway: I-95/395

Date: Nov. 1979

Site Location: Bridge Site IV - Finishing work on elevated section of I-395

Type of Measurements:

☐ Community
☑ Activity
☐ Propagation
☐ Site Boundary
☐ Single Equipment
☐ Movies

Soil/Terrain Conditions: Measurements taken on elevated section; concrete roadbed.

Machinery Description:

Homelite 2000 Watt Generator
Hand-held electric grinder
Medium duty truck
Man using hammer and chisel

Miscellaneous Information:

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Bridge Site IV

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-46	B-10	11-12	1005	:06	11-12A	Finishing work on bridge	✓

ACTIVITY NOISE MEASUREMENTS

HIGHWAY: I-95/395

DATE: Nov. 1979

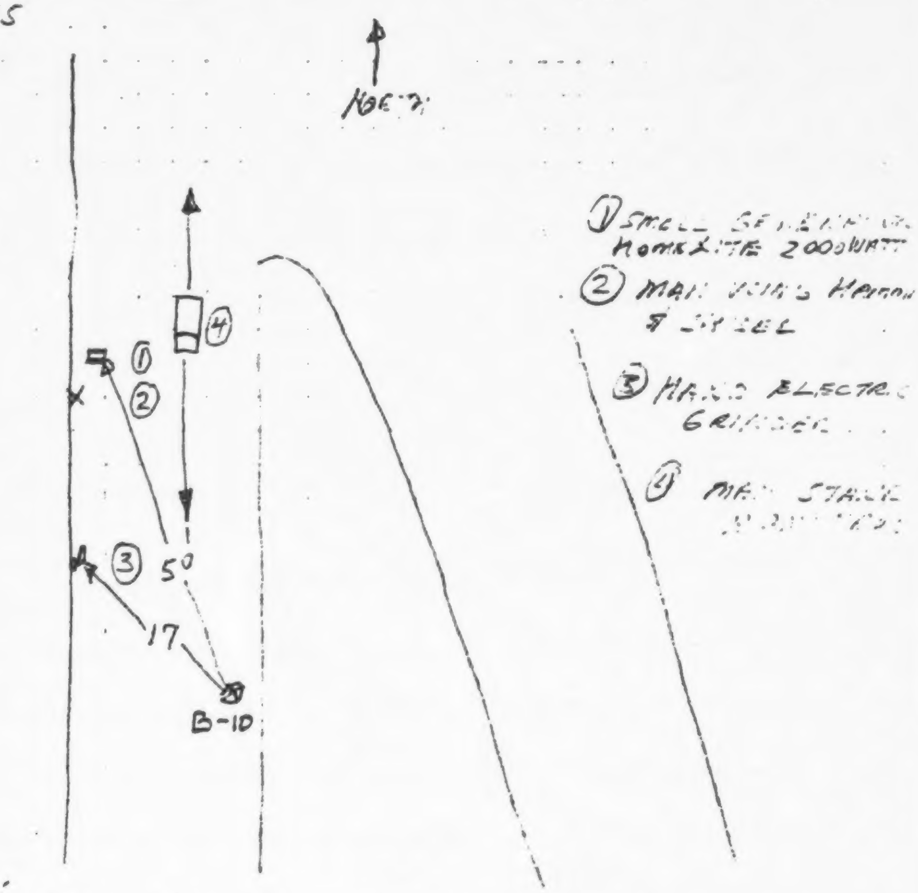
SITE LOCATION: Bridge Site IV

Sample	Location	Date	Dur.	L_{eq}	L_{99}	L_{90}	L_{50}	L_{10}	L_1
47-45	B-10	11-12	:06	74	61	66	73	78	79

DIAGRAM 11-12A OVERPASS FINISHING

ANALOG 45

#10 ft


NORTH
④
①
②
×
③
50
17
B-10
① SMALL GENERATOR HOMELITE 2000WATT
② MAN USING HAMMER & CHISEL
③ HAND ELECTRIC GRINDER
④ MAN STACKING [illegible]

METROSONICS:
Lmax 84 Leq 73 FOR 6 min

Measurement Site Data

Highway: I-95/395

Date: Nov. 1979

Site Location: Concrete Batch Plant

Type of Measurements:

☐ Community ☐ Activity ☐ Propagation

☑ Site Boundary ☑ Single Equipment ☐ Movies

Soil/Terrain Conditions: Flat terrain

Machinery Description:

Mack Cement Trucks w/ Straight Stacks
Diesel Generator
IH Hough 80 Pay Loader

Miscellaneous Information:

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Concrete Batch Plant

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-22	BP-1	11-7	1000	:10	11-7C	Site Boundary; near generator	✓
-23	BP-2	↓		:06	↓	Site Boundary; near Cement pump	✓
-24	BP-3	↓		:03	↓	Site Boundary; near front-end loader	✓
-25A	BP-4	↓		:03	↓	Site Boundary; background only	✓
25B	BP-4	↓		:09	↓	Site Boundary: during mixing cycle	✓

SITE BOUNDARY/COMMUNITY NOISE MEASUREMENTS

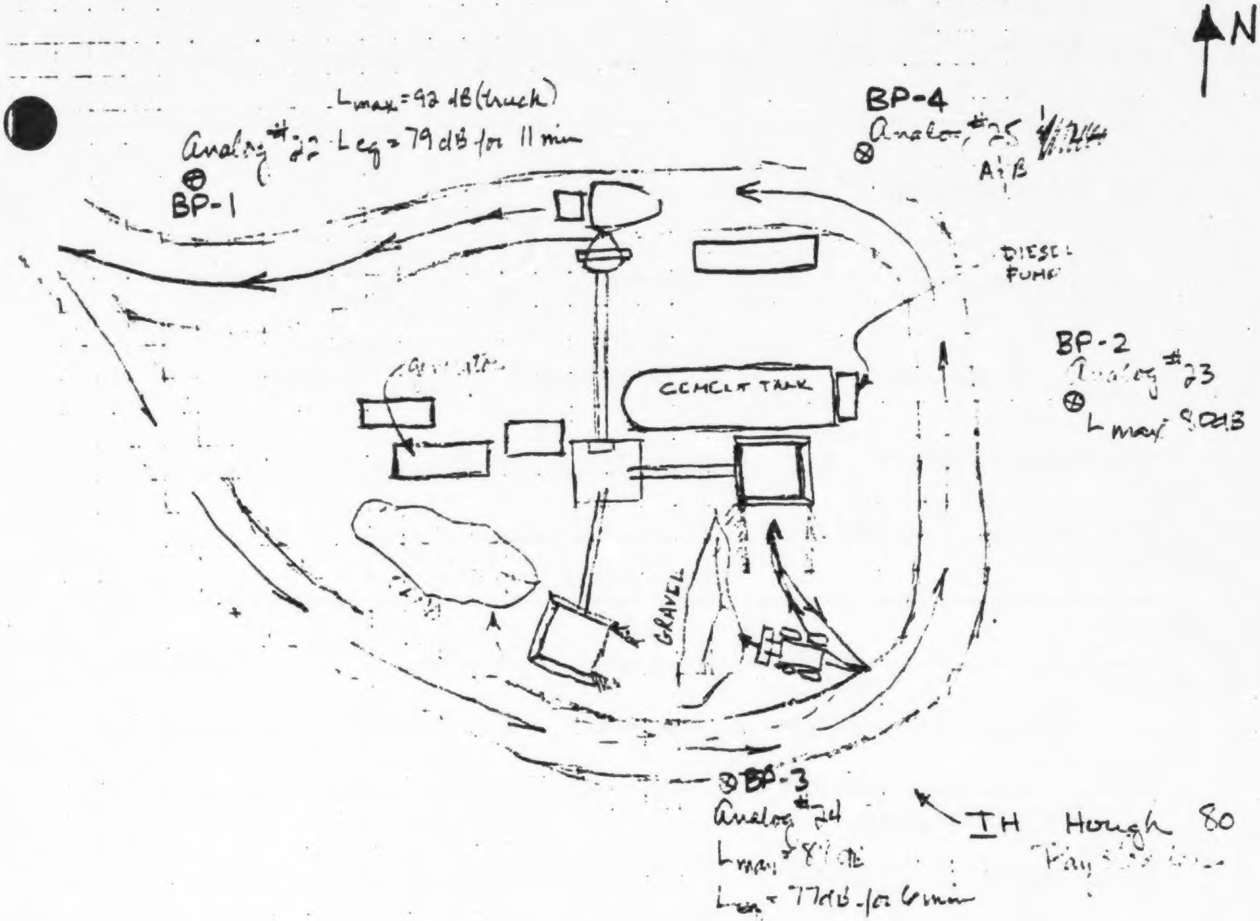
HIGHWAY: I-95/395 DATE: Nov. 1979

SITE LOCATION: Concrete Batch Plant

Sample	Location	Date	Dur.	L_{eq}
47-22	BP-1	11-7	:10	79.2
-23	BP-2	↓	:06	80.9
-24	BP-3		:03	82.2
-25A	BP-4		:03	69.4
-25B	BP-4		:09	74.7

DIAGRAM 11-7C CONCRETE BATCH MIXING PLANT

Mack Cement Truck w/ Straight Stack



BP-1
Analog #22 Leq = 79 dB for 11 min
Lmax = 92 dB (truck)

BP-4
Analog #25 [illegible]

BP-2
Analog #23
Lmax 80 dB

BP-3
Analog #24
Lmax = 81 dB
Leq = 77 dB for 6 min

IH Hough 80
[illegible]

Measurement Site Data

Highway: I-95/395 Date: Nov. 1979

Site Location: Single Equipment Measurement - Front End Loader

Type of Measurements:

☐ Community ☐ Activity ☑ Propagation

☐ Site Boundary ☑ Single Equipment ☐ Movies

Soil/Terrain Conditions: Propagation measurements performed on concrete roadbed

Machinery Description:

Clark-Michigan 175B Front End Loader

- Engine fully enclosed

Miscellaneous Information:

NOTE: Sample 21A: Left-side of loader facing mic's
21B: Rear (fan intake) facing mic's

DATA LOG SUMMARY

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: Single Equipment

Sample	Location	Date	Time	Dur.	Site Diag.	Comments	Reduced
47-21A/B	E-1	11-7	-	-	11-7A	STATIONARY TEST : LEFT SIDE OF LOADER FACING MICROPHONE	✓
-21C/D	E-1	11-7	-	-	11-7A	STATIONARY TEST: REAR SIDE OF LOADER FACING MICROPHONE	✓
-21E	E-2	11-7	-	-	11-7B	OPERATIONAL TEST: LOADER SCOOPING DIRT	✓

SINGLE EQUIPMENT/PROPAGATION NOISE MEASUREMENTS

HIGHWAY: I-95/395

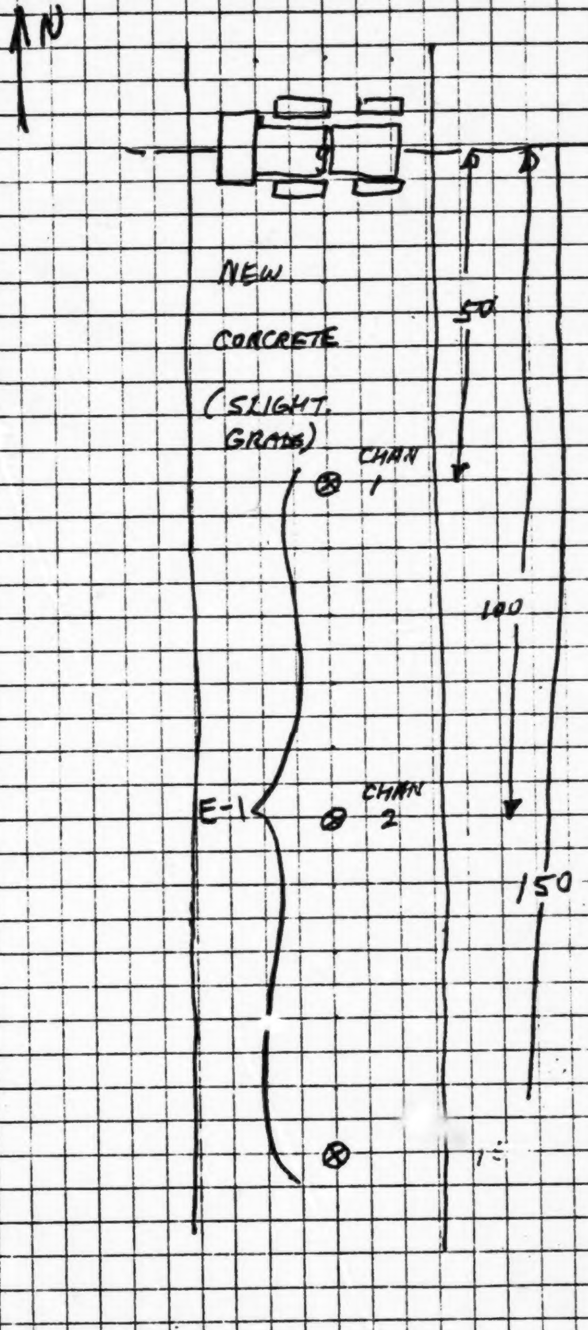
DATE: Nov. 1979

SITE LOCATION: Single Equipment

Sample	Location	Date	Equipment	L_{max} @ 50 ft.	L_{max} @ 100 ft.	L_{max} @ 200 ft.
47-21A/B	E-1	11-7	LOADER: SIDE FACING MICROPHONE	85	79	74
-21C/D	E-1	11-7	LOADER: REAR FACING MICROPHONE	87	82	75
-21E	E-1	11-7	LOADER:	83	—	—

DIAGRAM N-7A STATIONARY RUN UP TESTING

CLARK-MICIGAN FRONT END LOADER 175B



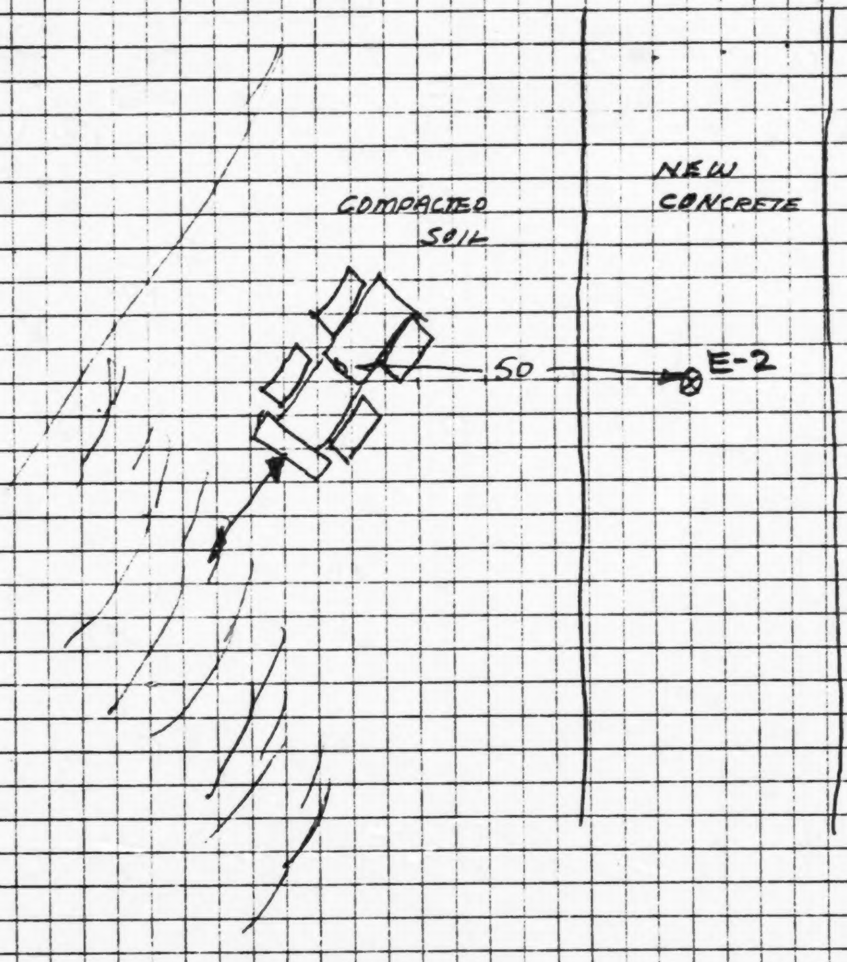
ANALOG #21

	MIC P	MEASUREMENT LOCATION
TEST A.	MIC 1 & 2	L.S.
B.	MIC 1 & 3	L.S.
C	MIC 1 & 3	REAR
D	MIC 1 & 2	REAR

DIAGRAM 11-7B

ANALOG 21E

OPERATIONAL TEST
FRONT END LOADER
MICHIGAN 175B (SAME PIECE OF EQUIPMENT
AS USED FOR STAT. TEST)



TEST: LOADER
MADE ONE
PICK-UP OF DIRT
FROM PILE OF
DIRT NEXT TO
NEW ROAD.

SINGLE EQUIPMENT/PROPAGATION NOISE MEASUREMENTS

HIGHWAY: I-95/395

DATE: Nov. 1979

SITE LOCATION: ______

Sample	Location	Date	Equipment	L_{max} @ 50 ft.	L_{max} @ ___ ft.	L_{max} -@ ___ ft.
METRO.	—	11-5	FIAT-ALLIS 545B FRONT END LOADER	84 @ 45'		
45-4	E-3	11-5	ONAN DIESEL GENERATOR	70		

DIAGRAM 11-5C

ONAN DIESEL GENERATOR

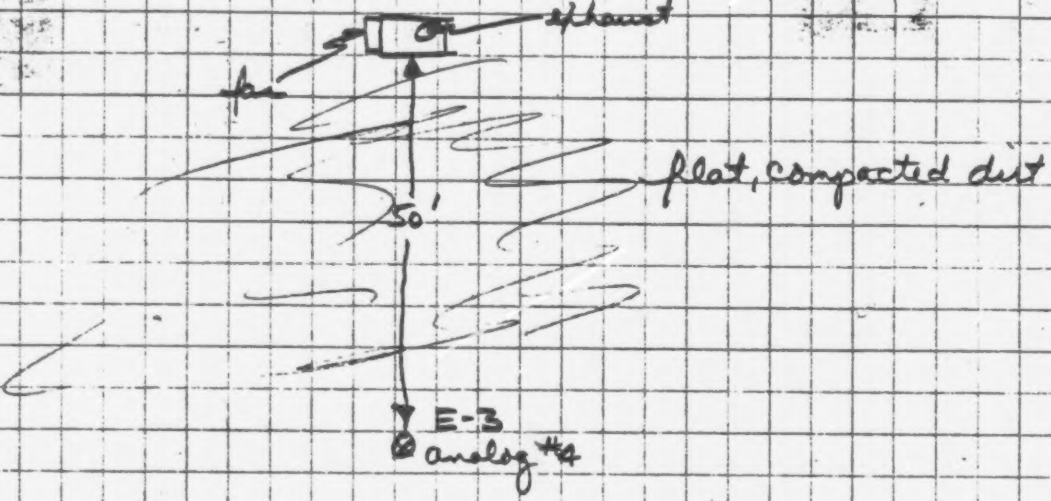


Photo Log - 35 mm

Roll #1

Frame #	Location	Date	Time	View or Subject
1	N/G	–	–	–
2	Fill Area I	11-6	0800	F-1 LOOKING SOUTH AT FILL AREA
3	↓	↓	↓	NEAR F-5, LOOKING SOUTH
4	↓	↓	↓	JAEGER AIR COMPRESSOR USED IN EQUIP. SUBSTITUTION TEST
5	↓	↓	↓	@ F-2, LOOKING EAST
6	↓	↓	↓	@ F-2, LOOKING NORTHEAST
7	Earthwork Site III	11-6	1030	@ EW-9 LOOKING NORTH AT BACKHOE LOADING TRUCK
8	↓	↓	↓	@ EW-9 LOOKING NORTH AT BACKHOE SCOOPING DIRT
9	↓	↓	↓	—
10	↓	↓	↓	@ EW-10 LOOKING WEST AT KOMATSU LOADER
11	Earthwork Site			
12	Paving Site I	11-6	1340	@ P-1 LOOKING WEST AT PAVER
13	Earthwork Site VI	11-6	1440	@ EW-16 LOOKING SOUTHWEST AT CONVEYOR
14	↓	11-6	1440	@ EW-16 LOOKING AT CONCRETE TRUCK
15	Earthwork Site VIII	11-6	1500	@ EW-18 LOOKING WEST AT BACKHOE
16	↓	11-6	1500	@ EW-19 LOOKING EAST
17	Bridge Site 1	11-6	1615	@ B-4; PILE DRIVER & CRANE
18	Single Equipment	11-7	0800	@ E-1 LOOKING NORTH AT LOADER
19	↓	11-7	0800	FRONT END LOADER; REAR VIEW
20	↓	11-7	0800	" " " ; FRONT VIEW
21	↓	11-7	0800	@ E-2; LOADER DURING OP. TEST

109

Photo Log - 35 mm

Frame #	Location	Date	Time	View or Subject
22	Single Equipment	11-7	0800	LOOKING SOUTH @ E-1 MIC'S
23	Batch Plant Site	11-7	1000	@ BP-1 LOOKING S.E. AT GENERATOR
24	↓	11-7	1000	@ BP-2 LOOKING WEST AT CEMENT PUMP
25		11-7	1000	@ BP-3 LOOKING NORTH
26		11-7	1000	@ BP-4 LOOKING AT MIXER
27	Fill Area I	11-7	1430	@ F-5 LOOKING SOUTH
28	↓	11-7	1500	@ F-6 LOOKING EAST AT PASSING TRUCK
29	Bridge Site I	11-7	0900	@ B-3 LOOKING NORTH AT TRACTOR-MOUNTED BREAKER
30	↓	11-7	0900	SAME AS # 29
31	Fill Area II	11-7	1500	@ F-9; SAMPLE NO GOOD
32	Earthwork Site VII	11-7	1555	@ EW-17 LOOKING AT BACKHOE
33	Bridge Site I	11-8	0900	ABATEMENT DEMONSTRATION; MIC. LOCATION FOR EQUIPMENT SUBST. MEASUREMENT
34	↓	11-8	0900	COMPARISON OF STANDARD AND QUIETED JACKHAMMERS
35		11-8	0900	ABATEMENT DEMONSTRATION; LOCATION OF MIC. W.R.T. JACKHAMMER
36	Bridge Site II	11-8	0955	@ B-6 LOOKING NORTHWEST AT CEMENT TRUCK AND BUCKET
37	↓	11-8	0955	PIER FORMWORK; CRANE WITH BUCKET IN RAISED POSITION; B-8 IN LEFT CORNER
ROLL # 2 1	—	—	—	N/G
2	Earthwork Site I	11-8	1430	@ EW-1 LOOKING SOUTH AT APPROACH RAMP FILL AREA.
3	↓	11-8	1430	@ EW-1 LOOKING SOUTH/SOUTHEAST
4		11-8	1430	@ EW-1 LOOKING SOUTHEAST

#2-9
PANORAMIC
SHOT
FROM
POSITION EW-1

104

Photo Log - 35 mm

Frame #	Location	Date	Time	View or Subject
5	Earthwork Site I	11-8	1430	@EW-1 LOOKING EAST/SOUTHEAST
6	↓	↓	↓	@EW-1 LOOKING WEST
7				@EW-1 LOOKING EAST/NORTHEAST
8				@EW-1 LOOKING NORTHEAST
9				@EW-1 LOOKING NORTH
10	Earthwork Site I	11-8	1450	@EW-2 LOOKING AT CRANE
11	↓	↓	↓	@EW-3 LOOKING AT BACKHOE
12				@EW-4 LOOKING SOUTH AT SCRAPER PASSBY
13				@EW-4
14				@EW-4
15				@EW-
16				@EW-6 LOOKING S.W. AT CRANE/PILE DRIVER
17				@EW-6 LOOKING NORTH
18				@EW-7 SCRAPER MOVING INTO POSITION IN FRONT OF DOZER (LOOKING N.E.)
19				@EW-7 LOOKING EAST; SCRAPER BEING PUSHED BY DOZER
20	Earthwork Site III	11-9	0945	@EW-12 LOOKING NORTH AT BUCYRUS-ERIE BACKHOE
ROLL#3 1	Bridge Site I	11-9	0930	STANDARD CHICAGO-PNEUMATIC JACKHAMMER
2	↓	↓	↓	@B-1 LOOKING WEST
3				STANDARD JACKHAMMER
4				QUIETED JACKHAMMERS

Photo Log - 35 mm

Frame #	Location	Date	Time	View or Subject
5	Bridge Site I	11-9	0930	SAME AS #4
6	↓	↓	↓	SAME AS #5
7	Bridge Site III	11-9	1145	@B-9 LOOKING NORTHWEST AT LEFT CRANE PREPARING TO RAISE GIRDER
8	↓	↓	↓	@B-9 LOOKING DUE NORTH
9				@B-9; LEFT-HAND CRANE
10				@B-9; RIGHT-HAND CRANE
11	Bridge Site IV	11-12	1005	@B-10; LOOKING NORTHWEST
12	Earthwork Site IX	11-12	1045	@EW-20 LOOKING EAST AT TRACK DOZER SITTING IDLE
13	Earthwork Site III	11-12	N/A	CLOSE-UP OF WATER TRUCK OPERATING ON STREET ALONG EAST SIDE OF SITE
14	Paving Site II	11-12	N/A	@P-3 LOOKING WEST AT DUMP TRUCK FEEDING ASPHALT TO PAVER
15	↓	↓	↓	@P-3 AFTER PAVER HAD PASSED
16				@P-3; DYNAPAC VIBRATORY ROLLER
17	—	11-2		CONCRETE PAVING TRAIN (NOT MEASURED DUE TO RAIN).
18	–			SAME AS #17
19	–			SAME AS #17
20	–			SAME AS #17
21	–			SAME AS #17

111

ROLL #1

NOT GOOD

#1

#2

112

#3

#4

113

#5

#6

#7

#8

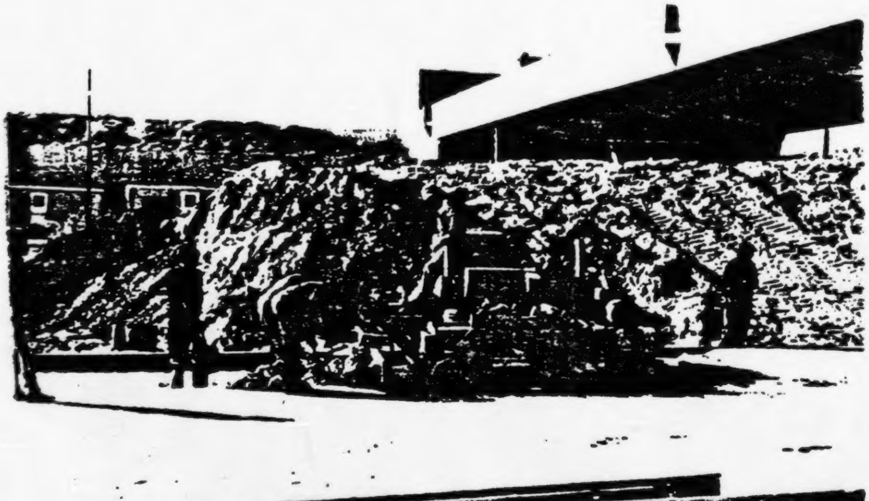
#9

#10

116

11

#11



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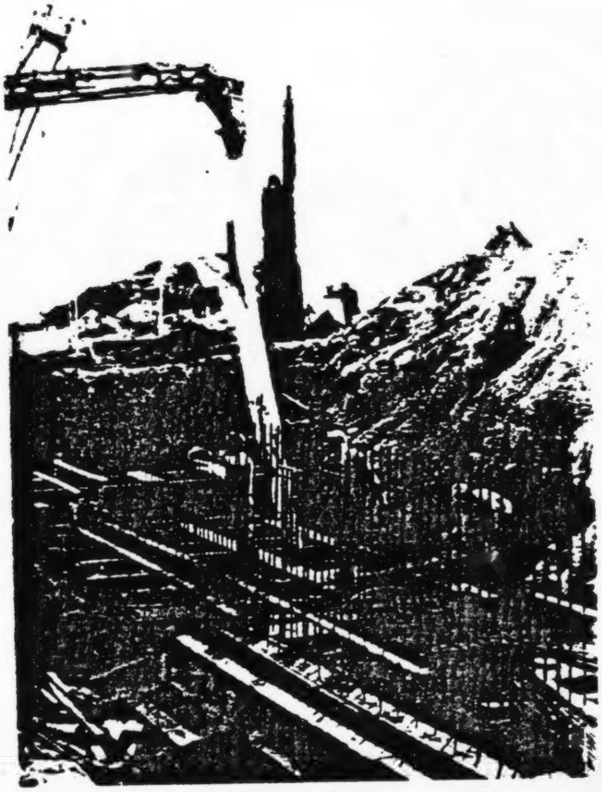

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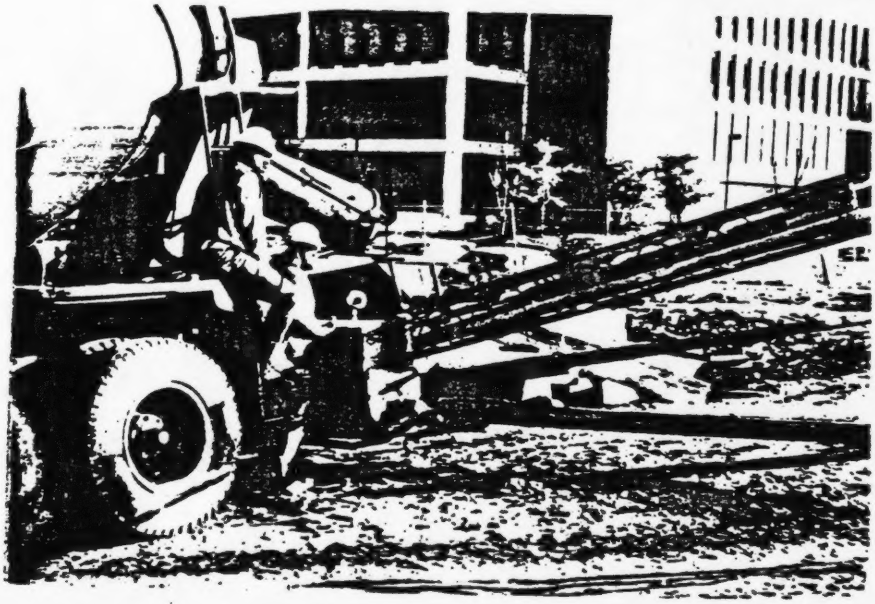

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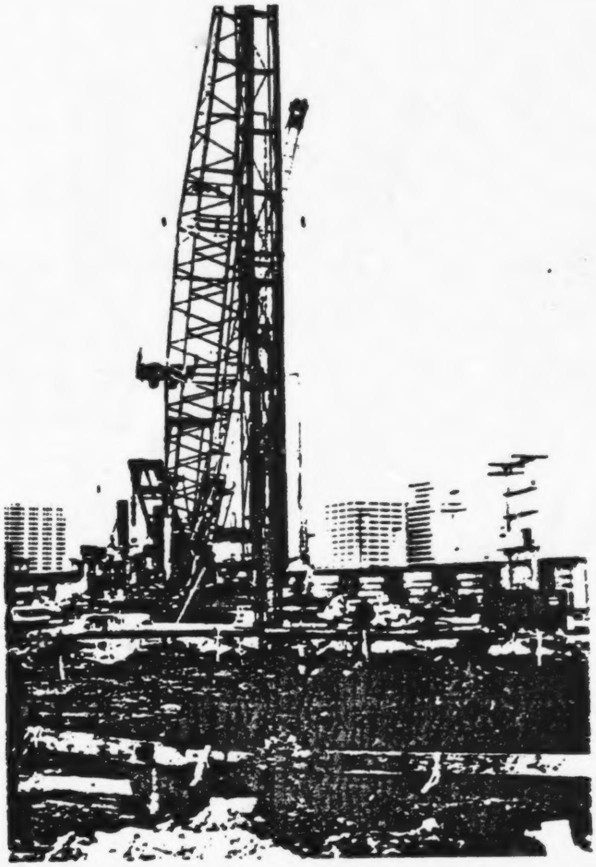
118

#15

#16



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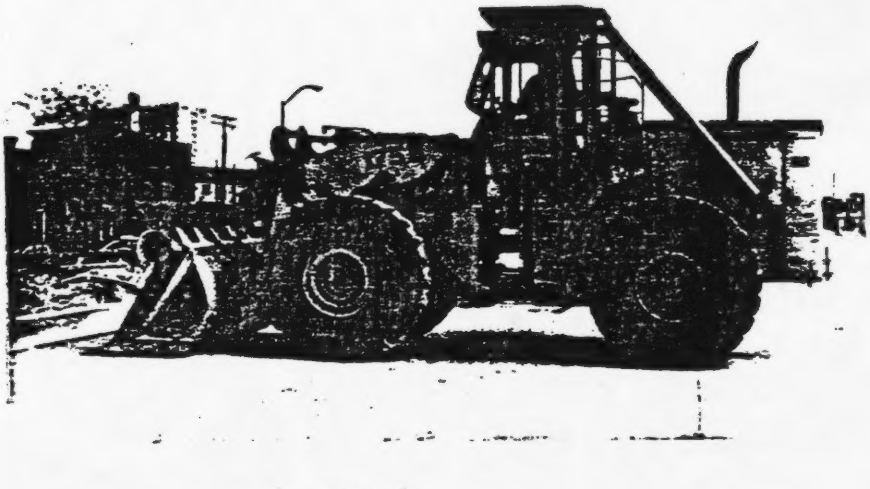

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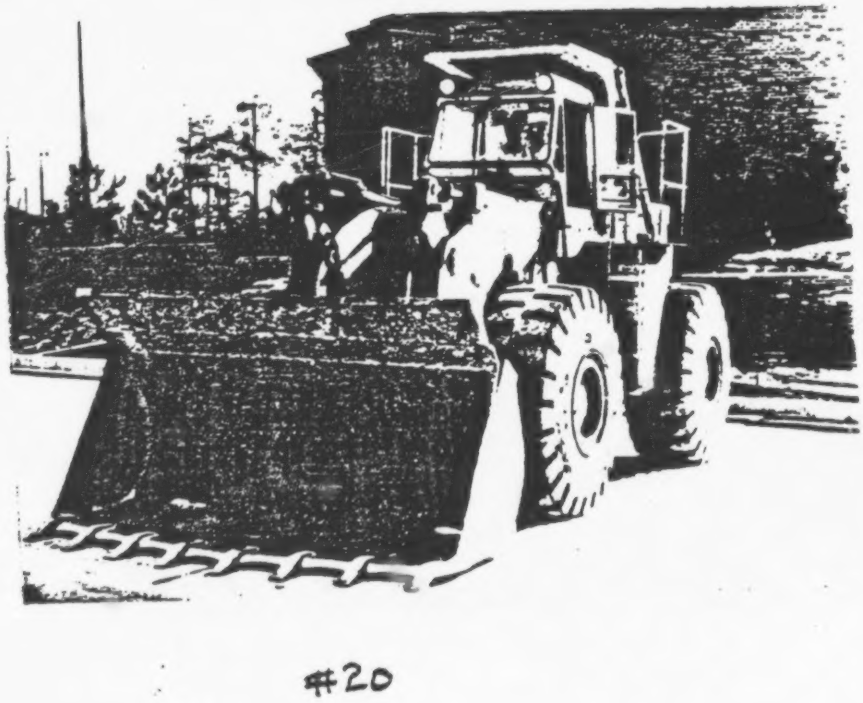
120

#19



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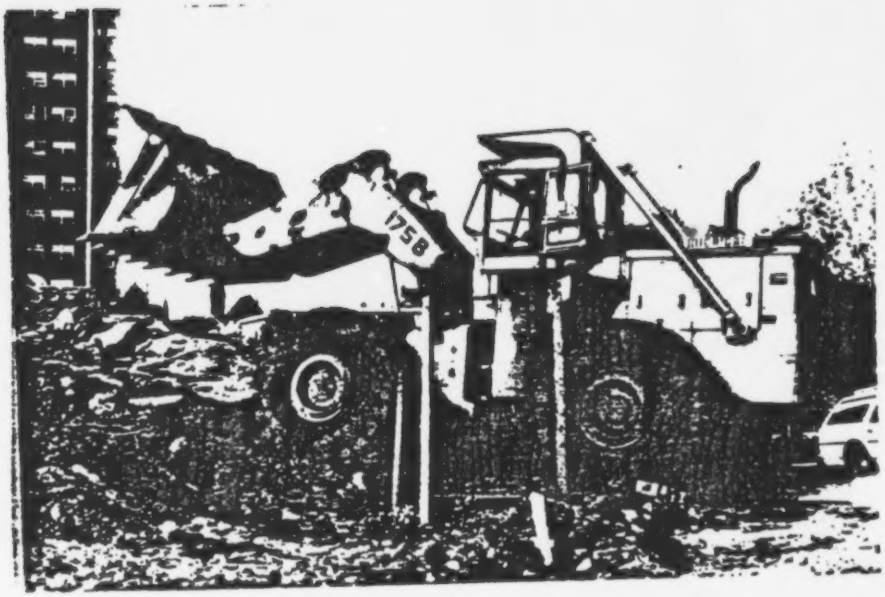

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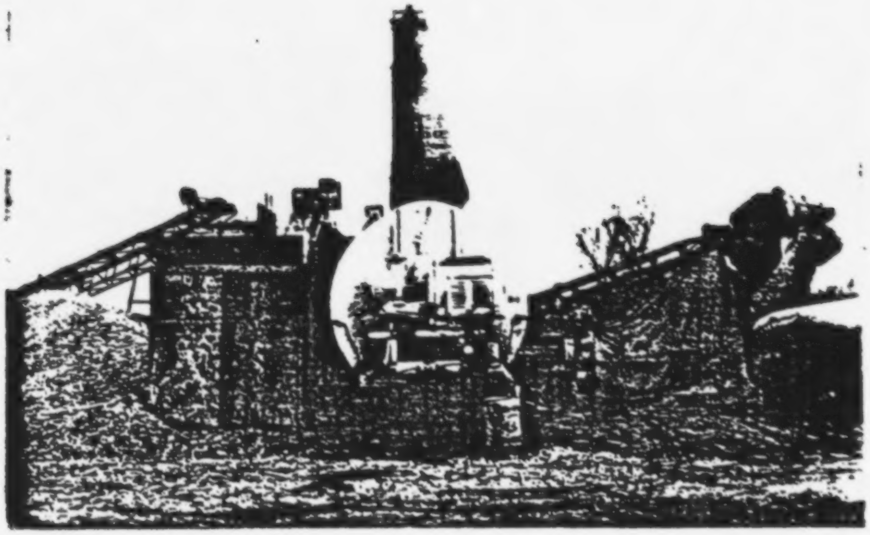

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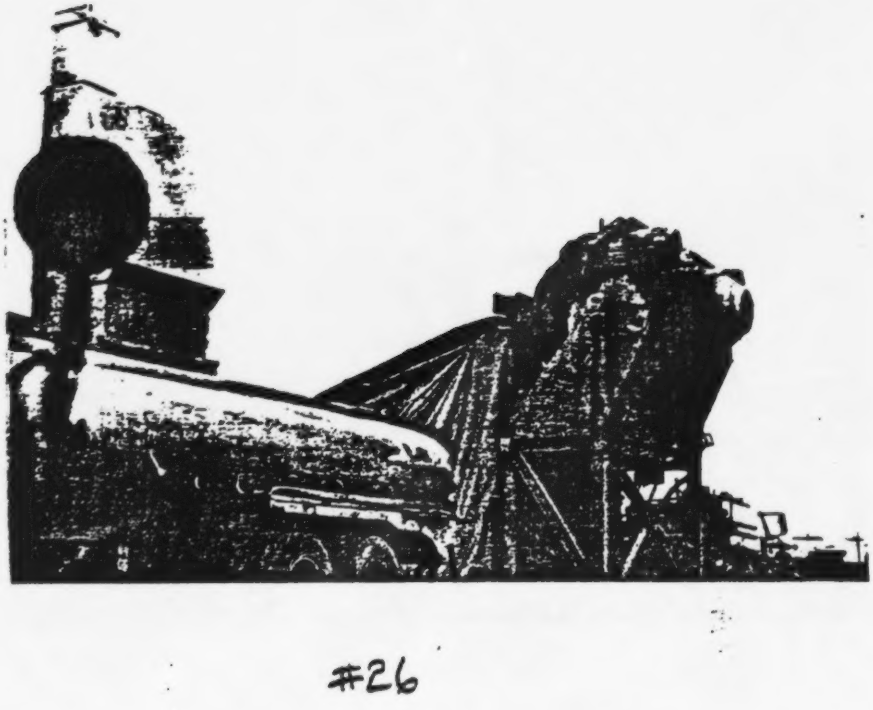

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#27

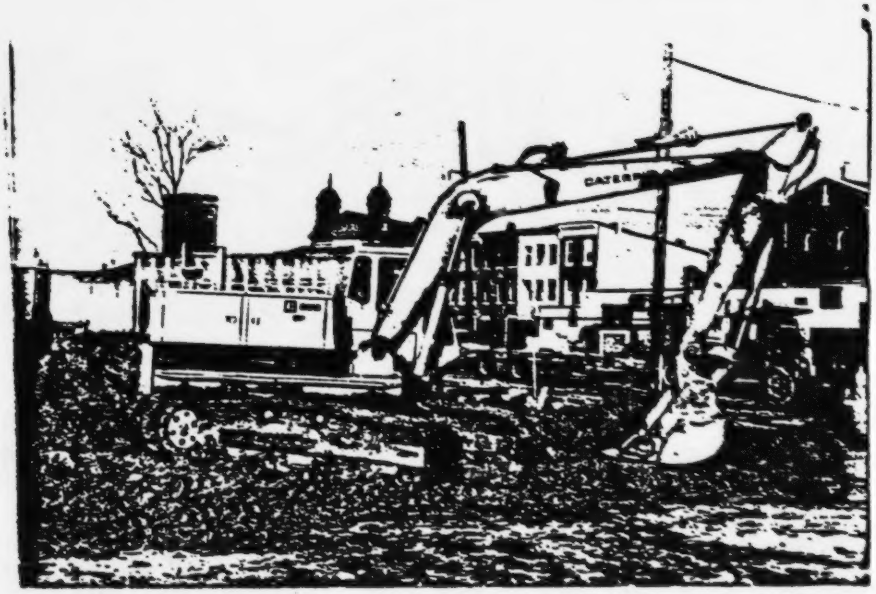
#28

125

#29

#30

#31



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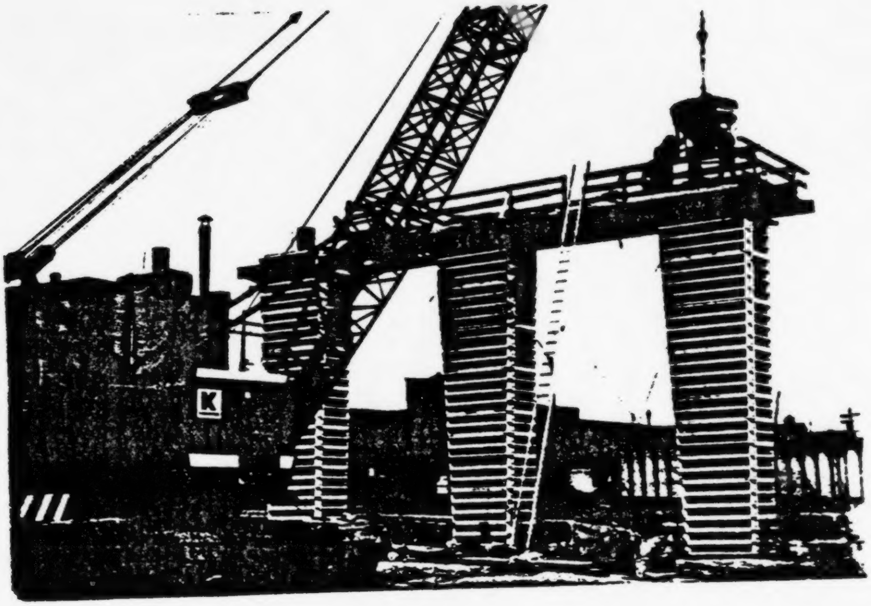

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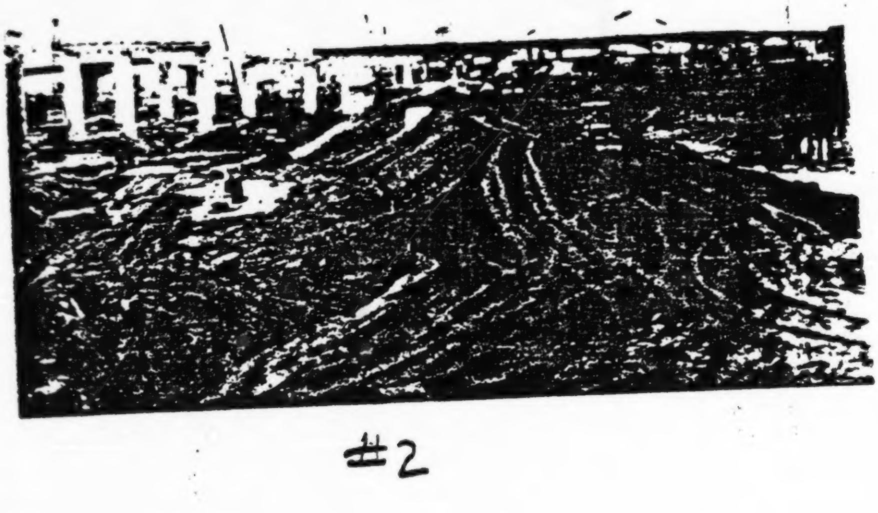
ROLL #2

#1 NOT GOOD



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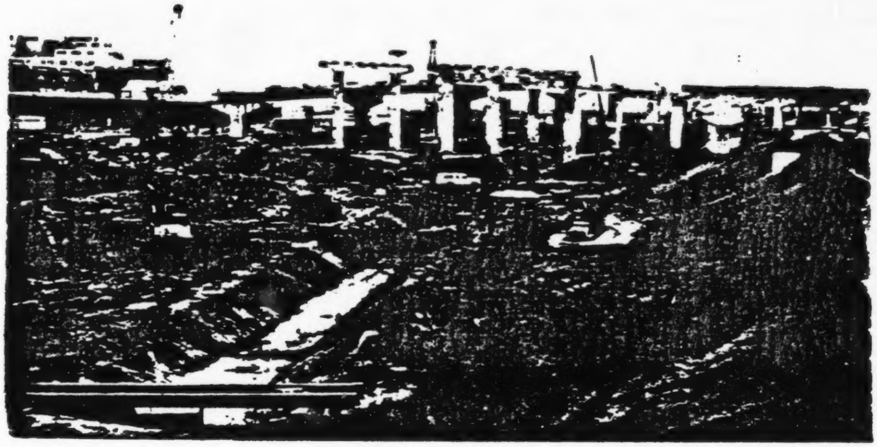

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#4

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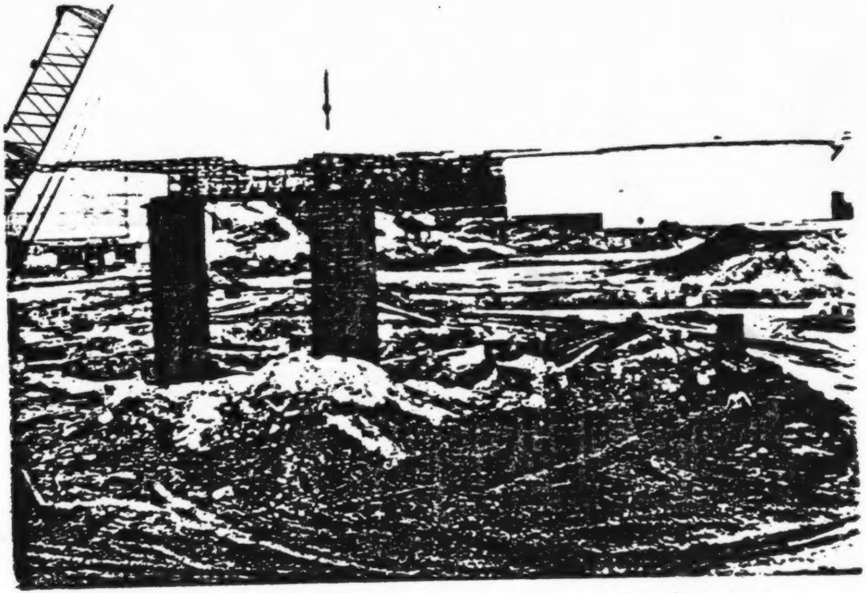

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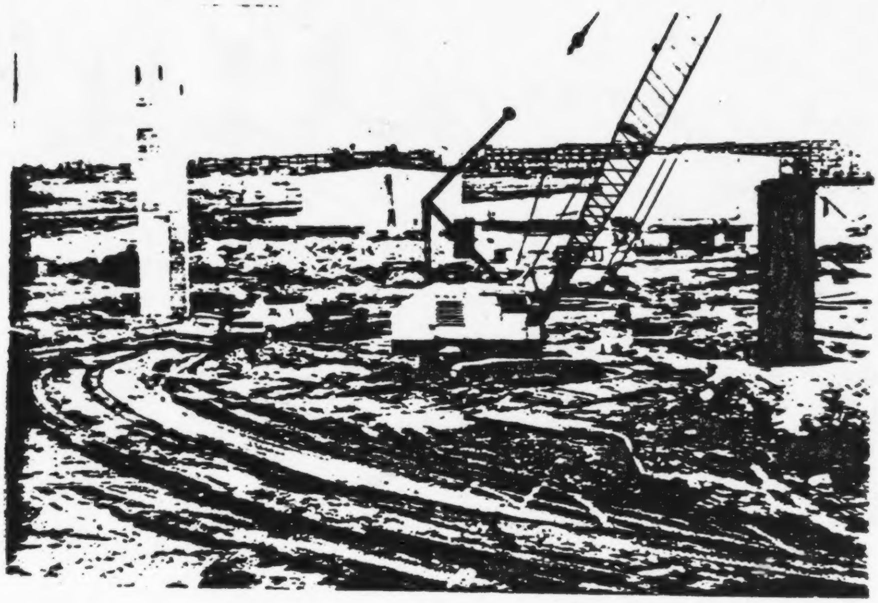

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#8

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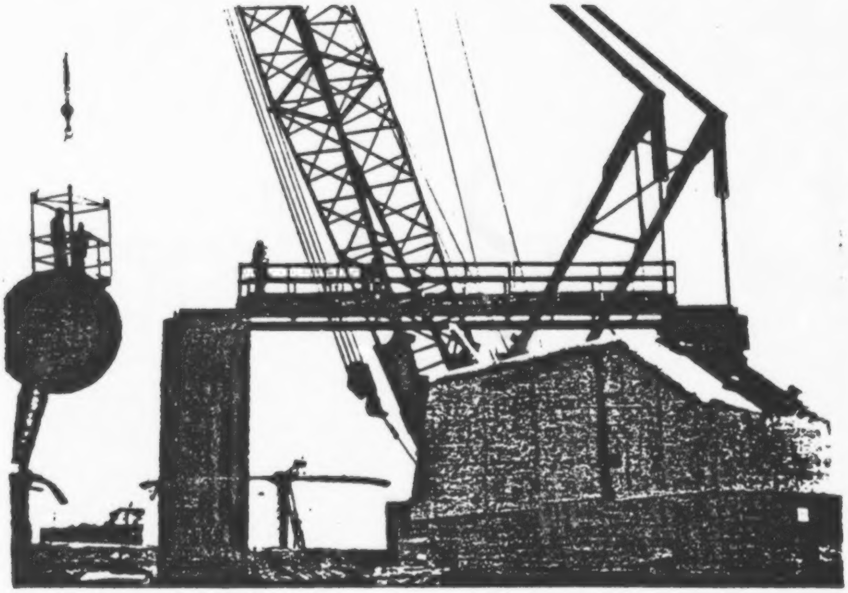

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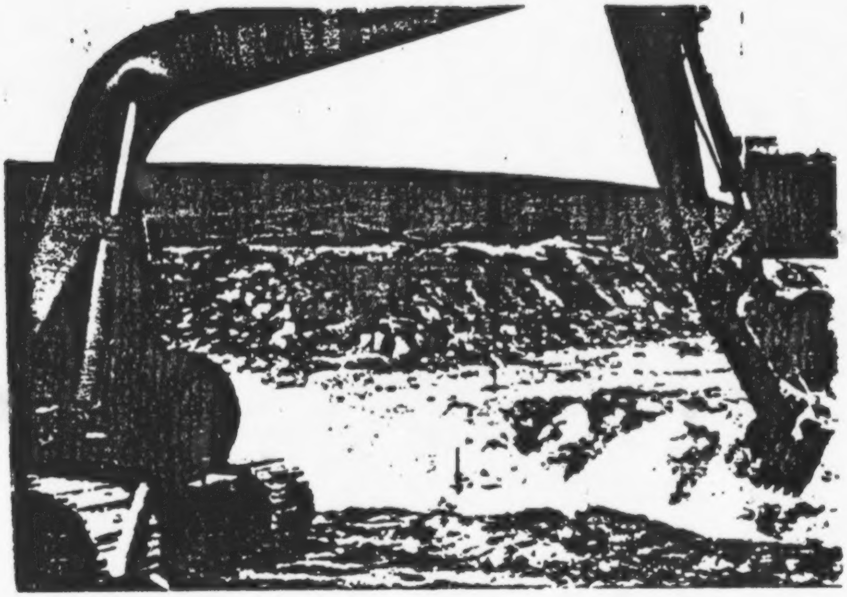

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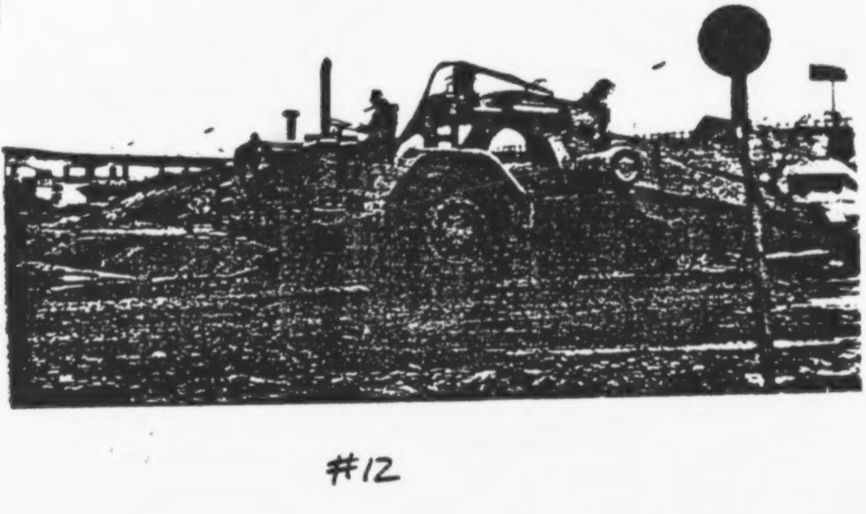

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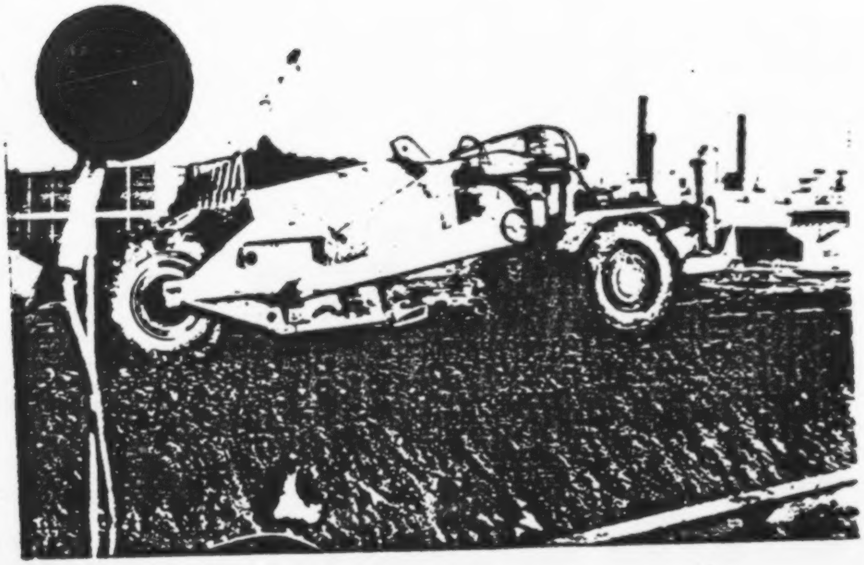

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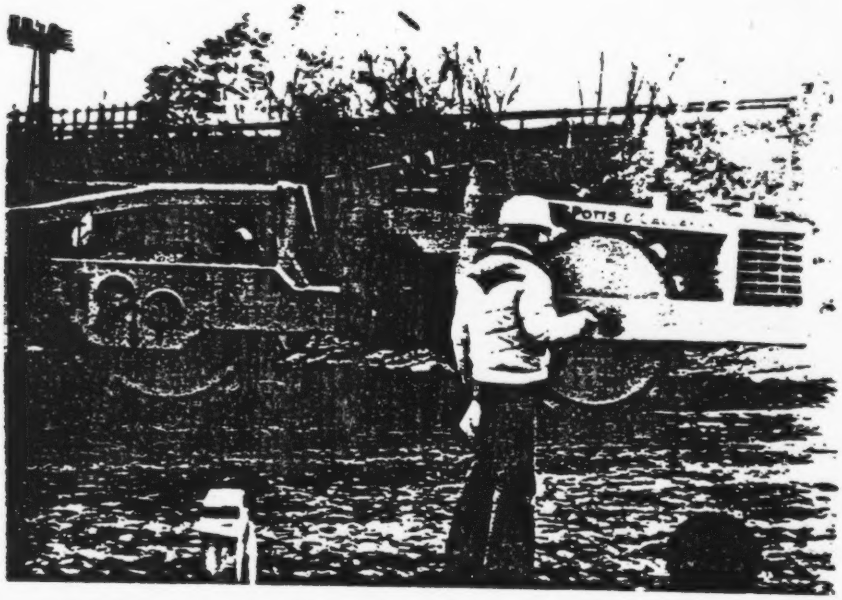

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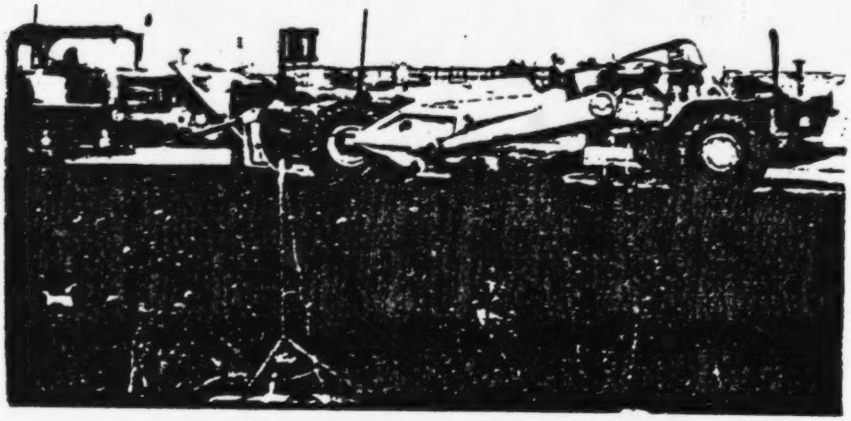
#16

#17

#18

139

134

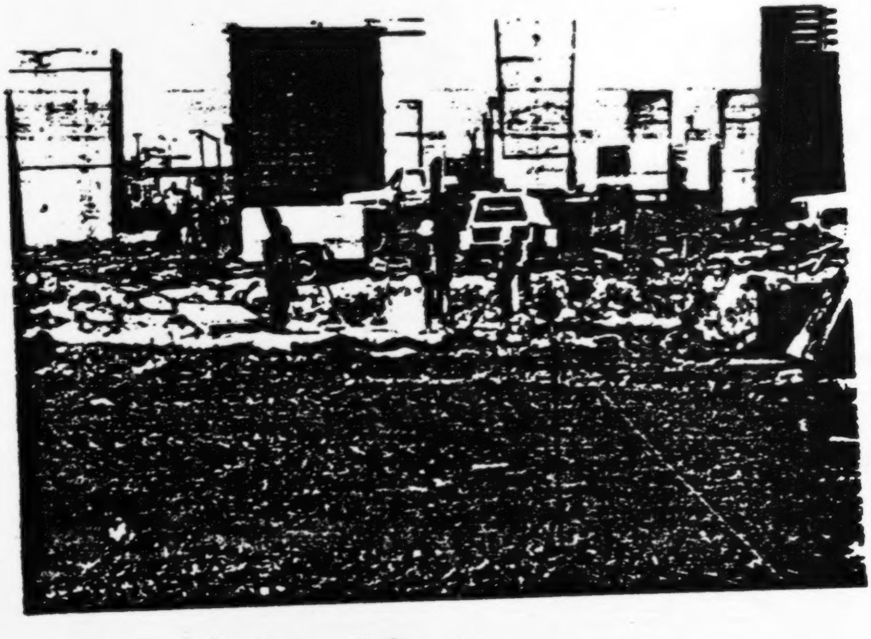


#19

#20

Roll #3

#1



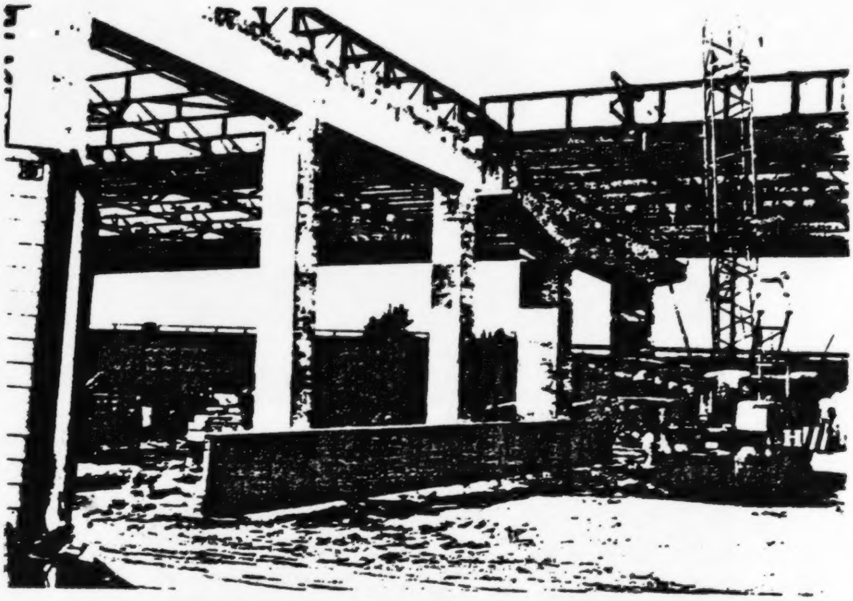
#2

#3

#4

#5

#6



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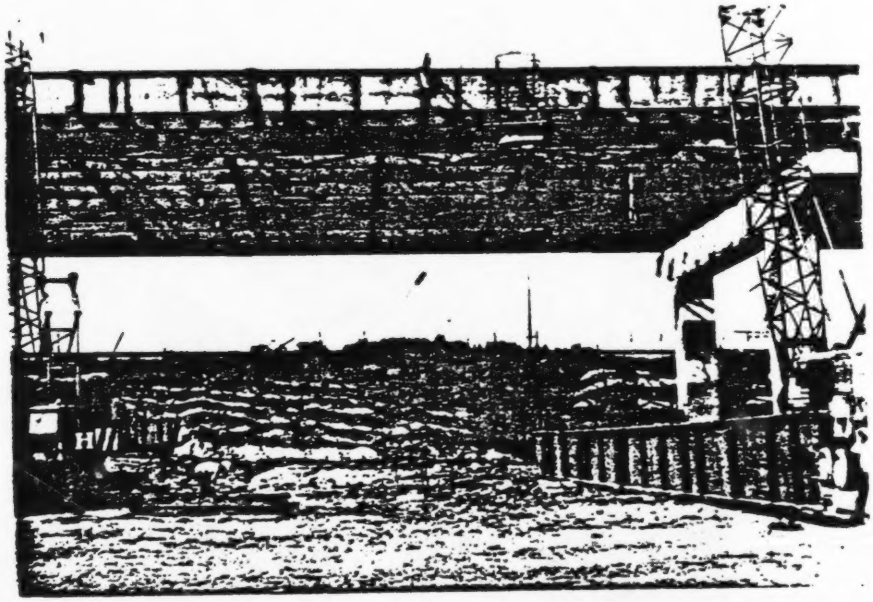

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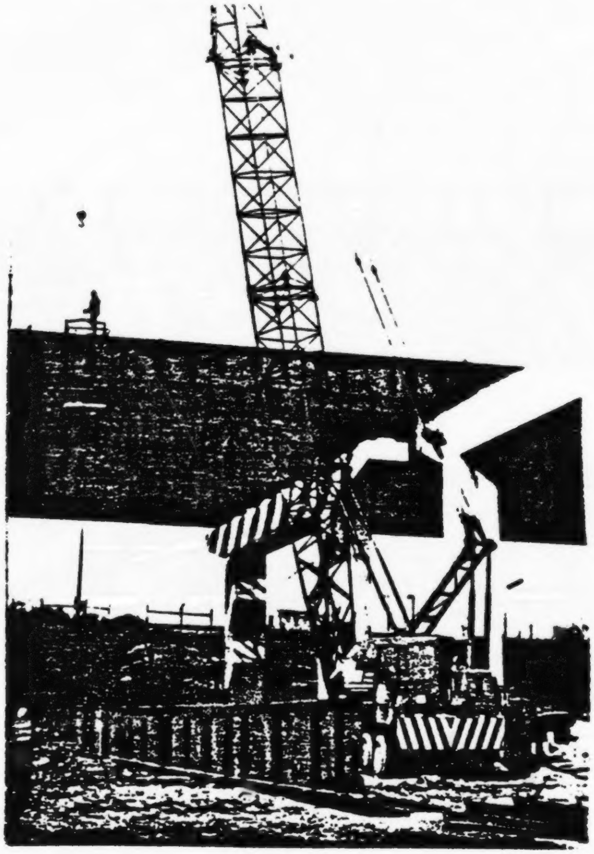

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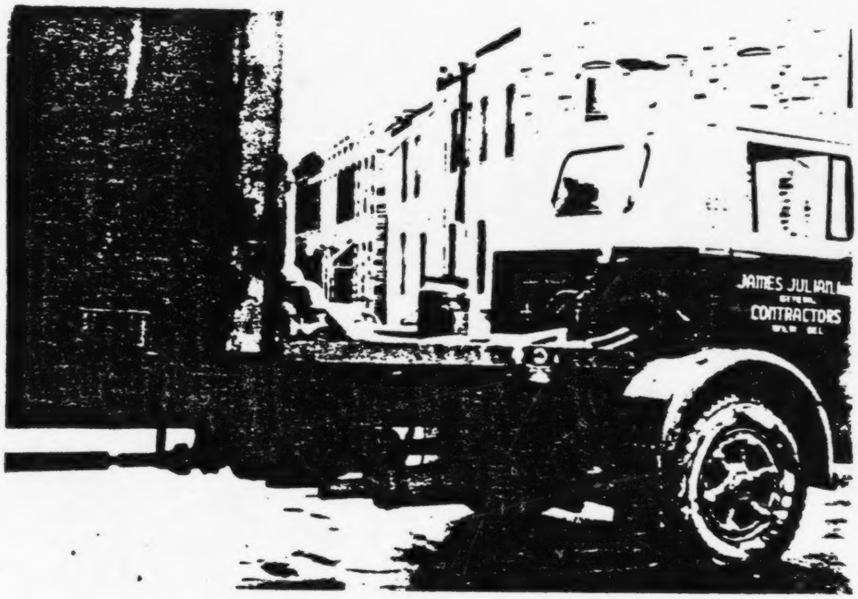
#11

#12

146



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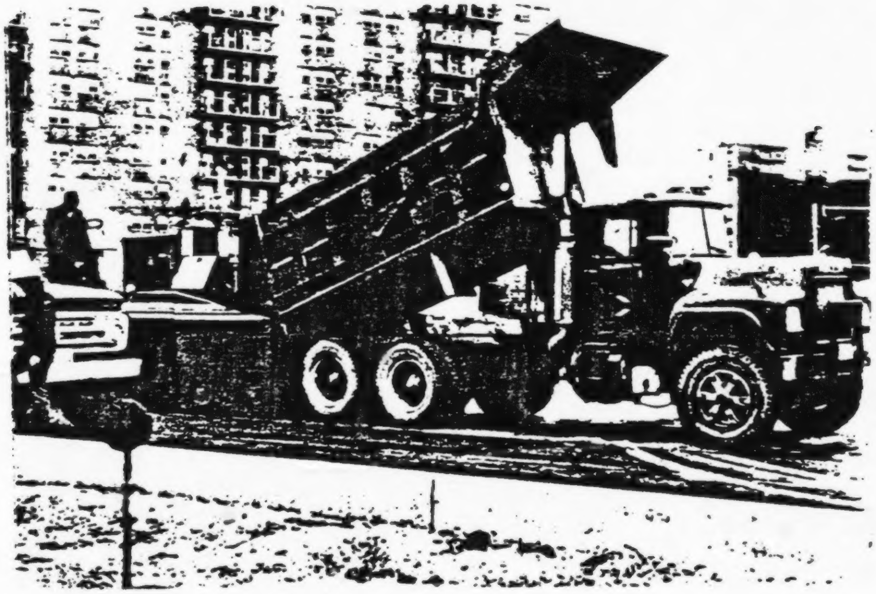

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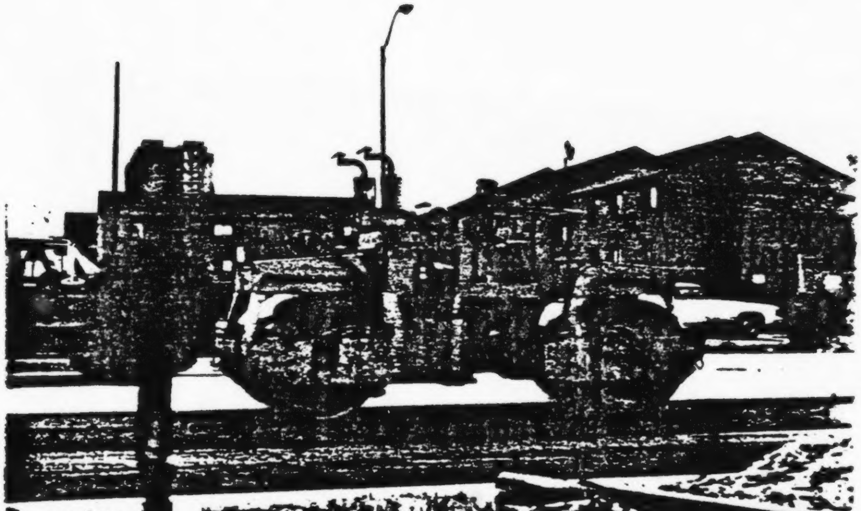

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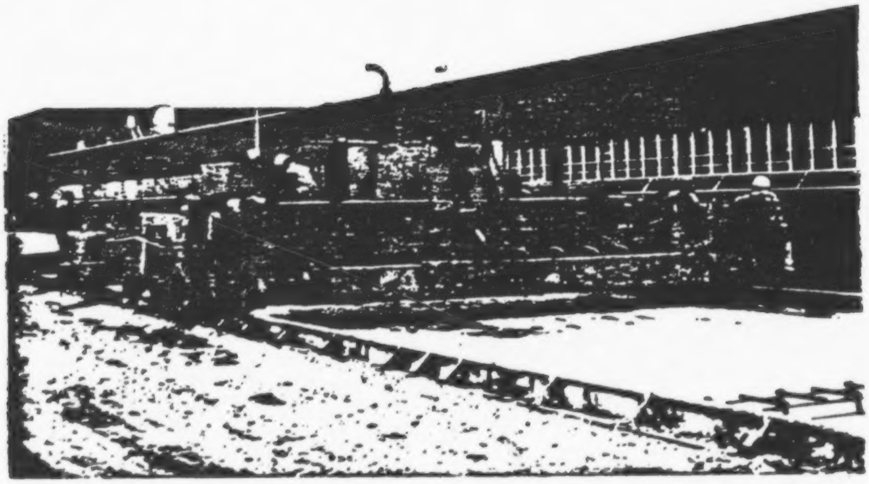

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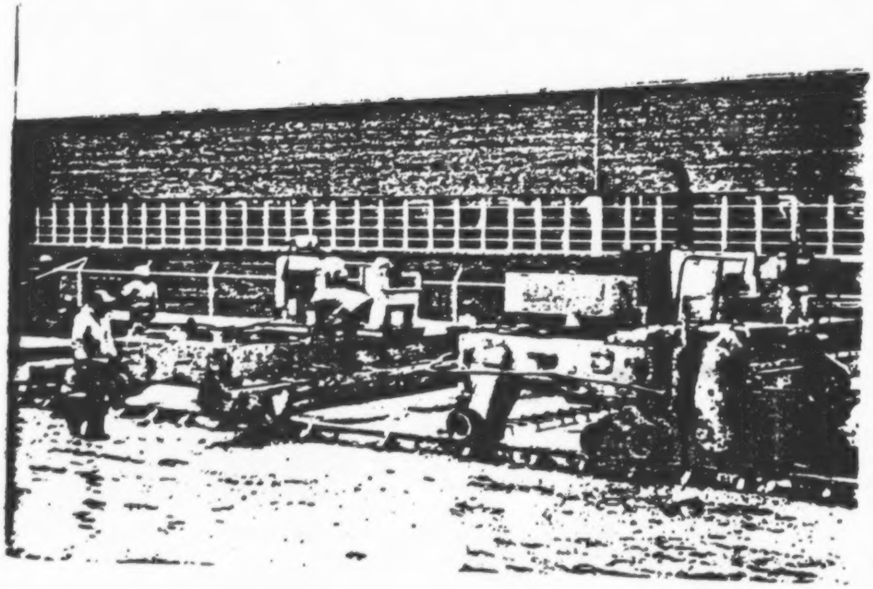

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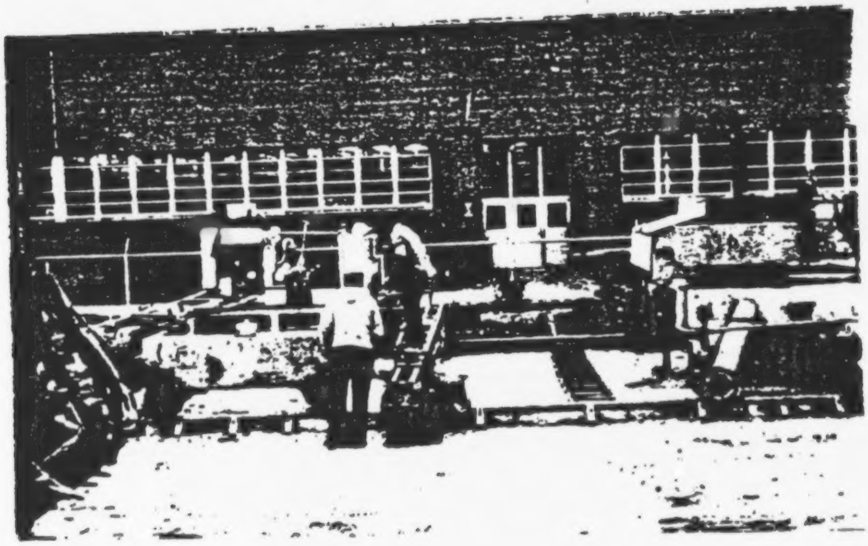

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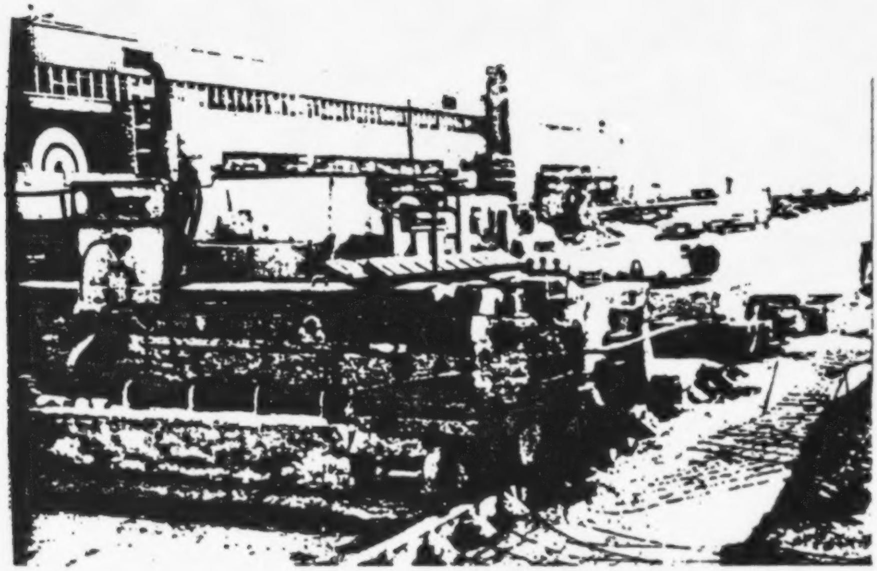
150



#21